AUTOMOTIVE INDUSTRIES
VOLUME 65 DECEMBER 5, 1931 NUMBER 23

20-4-35

Sounds Like Football Signals

But it's a simple number sequence illustrating gross rating—Maximum gradient—Top speed, formula accepted by S.A.E. Committee

by George T. Hook

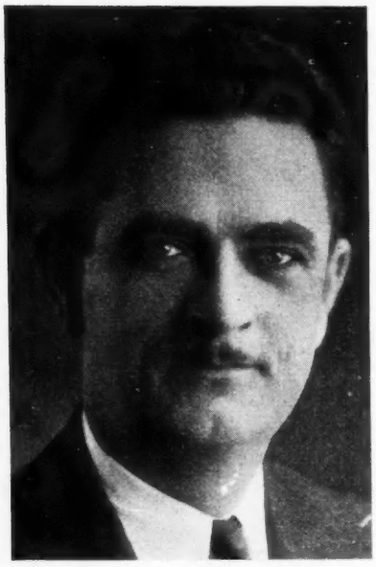
A. G. Herreshoff, who presented the accepted system

BARRING the unforeseen, the motor truck of the future won't be rated as a 3-ton or a 4-ton vehicle. It will have a designated rating expressed in three simple, readily-understood figures, such as 20-4-35, in which the first figure represents gross weight pounds in thousands; the second, per cent of grade in high gear, and the third, maximum miles per hour at governed speed or maximum recommended engine speed. Though the new designations might sound like football signals they look very much like the right answer.

So much was agreed upon at a meeting of the S.A.E. truck rating standardization committee in Washington during the national transportation meeting. The committee made such remarkable progress that it evoked expressions of wonderment and mutual congratulations from the factory engineers, other factory executives and truck operators who were present. Many of them were veterans of committee work who previously were sincere in their belief that the rating standardization matter would drag on down the years into 1934 or 1935. To them the rating committee's accomplishment was nothing short of phenomenal.

Major credit for progress made must be given to A. G. Herreshoff, chief truck engineer of Dodge Brothers, who presented concrete suggestions which had been worked out by the Dodge truck engineering department. The unselfishness of this thoughtful cooperation was evident from Mr. Herreshoff's own statement that the rating he suggested did not particularly favor Dodge Brothers' trucks. "As a matter of fact," he said, "it can be considered detrimental to the present type of design, that is, the design with modern high-speed engines instead of the low-speed engines more generally in use by truck manufacturers."

The idea of incorporating in the rating the three factors mentioned above was contained in Mr. Herreshoff's recommendation. Reasons for choosing the factors were argued so thoroughly that the committee was able to devote its entire



L. R. Buckendale, chairman of the S.A.E. Truck Rating Standardization Committee + + +

attention to the clarification of certain moot points.

Gross weight is the most important factor, Mr. Herreshoff argued, because the initial conception of the motor truck industry rests on the demand for a medium of transportation possessing certain advantages alien to all other existing equipment. This principle is fundamental, and therefore the size of the truck must be specified first, then qualified with respect to such specific attributes as type of body, size of body, ability, type of tires, size of tires and speed.

The tires determine the gross weight, not the frame. The frame may conveniently carry a few hundred or a few thousand more pounds, but that simply means the vehicle is one of superior quality and not of superior capacity. Quality of materials can have no bearing on the official rating. It is not a matter of rating but rather a question of policy for the manufacturer to decide according to his conception of what is proper and equitable.

Another reason advanced in favor of making gross weight the key to the rating was the fact that legal restrictions are generally based on gross weight because it is the only figure which can be readily and accurately determined and checked.

The importance of tire influence on capacity was emphasized by the committee when it passed a motion to the effect that "gross weight rating set by the manufacturer must be consistent with tire capacity rating."

The second factor, Mr. Herreshoff recommended, should be the per cent grade which can be negotiated in high gear, and which should be calculated from the piston displacement, axle ratio and gross weight of the vehicle, using a standard conversion factor to obtain engine torque. He suggested that a rolling resistance of 10 lb. per thousand of gross vehicle weight be assumed. In this way, he reasoned, the customer will have an exact and accurate index for comparing the ability of the competitive equipment he may have under consideration; an index determined by a standard formula and not susceptible to exaggeration by overenthusiastic salesmen. It possesses the virtue that it is a close approximation of what the truck will actually do even though it may not be possible of exact demonstration.

In connection with the grade factor, the term "high gear" came in for discussion and it was finally agreed that "high gear as indicated should be taken to mean the direct gear or the comparable operating gear in vehicles which do not have direct gear ratio in the transmission."

The speed in miles per hour at which a truck can mount a given grade was dismissed in the recommendation as a worthless rating element, simply because no mathematical consideration can be taken of the speed at which the hill is entered nor the condition of the road surface—both factors having an important bearing on the actual velocity on the grade.

Grade ability, according to Mr. Herreshoff, without a speed-qualifying factor is of little importance as it is figuratively possible to make a 1 hp. truck climb a brick wall, provided it has a sufficient axle reduction. Moreover, customers are greatly interested in knowing the actual maximum speed of a truck rather than the theoretical speed up some hypothetical hill. Hence he urged inclusion of the governed speed which can be guaranteed and proved the maximum recommended engine speed.

Although the explanation did not come up at the meeting, it must be apparent that an official conversion table to supplement gross vehicle weight ratings is necessary. First, because laws in many states are still based on tonnage capacities, and, second, because an official table would eliminate the confusion which would be certain to result if each manufacturer were permitted to convert according to his own ideas.

While the committee agreed unanimously upon the form a standard truck rating should take, reconsideration of its decision remains a committee prerogative. No change, however, is expected.

The committee's next task is to work out the ability factors expressed in the rating as "per cent of grade." It is not a simple task, but if the mood which prevailed at the Washington meeting is sustained, the committee will safely surmount all obstacles.

The Zero Hour—

These weeks are stirring times in the automotive industry. For months manufacturers have been marshaling a titanic array of new developments to launch the gigantic merchandising struggle of 1932.

Here, in this magazine, you will find the finest descriptions of these sinews of a great financial war.

Here, have appeared complete articles on the new Buick, Pierce-Arrow and the custom creations seen at the Salon.

Here, descriptions of Chevrolet, Studebaker, Pierce-Arrow's V-12, Rockne and the new Lincoln V-12 appear this week.

Here will appear technical articles on other makes which will officially move into the fray when the most critical sales season in history opens in Grand Central Palace on Jan. 9

JUST AMONG OURSELVES

Cutting the Coat to Fit

DEPT. OF COMMERCE has published 358 examples of business organizations who have made good progress during the depression together with the reasons therefor. It's a noble effort, but study of the 35-page report indicates to us just about one thing: Success during the depression was achieved through vigorous and thorough application of sound policies devised for specific company needs.

Which leaves us about where we were when we started. There's no formula and there's no self-energizing policy. Vigorous, competent administration has to follow the conception and adoption of sound policy principles. Almost every organization falls down in one respect or the other somewhere along the line. When it doesn't it's successful usually in good times or in bad.

The reason study of others' success does most of us so little practical good rests largely in the fact that the success in practice usually depends more on how an operation is done than on what the policy is.

Hence management in its broadest and narrowest senses become the determining factor in success, and management is just the application of individual human intelligence to industrial problems. So the fitness or unfitness of human beings for their individual jobs becomes the final determining factor in industrial progress or retrogression.

Profit Decline in 1931

IN case there's been any doubt in your mind about 1931 having ing been a poor year for automobile manufacturers, those doubts will be set at rest by the National City Bank of N. Y., which publishes figures showing that in only three other industries has the decline in profits between 1930 and 1931 been as great as in the automobile business—General Motors being excluded from the tabulation. Twelve automobile companies, excluding G.M., showed profits 58 per cent lower than last year during the first nine months. Profit decline among machinery makers was greater also in the steel and non-ferrous mining industries.

When General Motors figures are included, however, the automobile profit decline is only a little over 30 per cent—which puts it about midway between the best and the worst of the 24 industries listed.

But as Kipling makes returned soldier say: "That's all shoved behind us, long ago and far away." At least it would seem so in the opinion of Alvan Macauley, who opines through the Associated Press that the automobile industry is about to be the spark that will light the fires of prosperity. Here's hoping he's right!

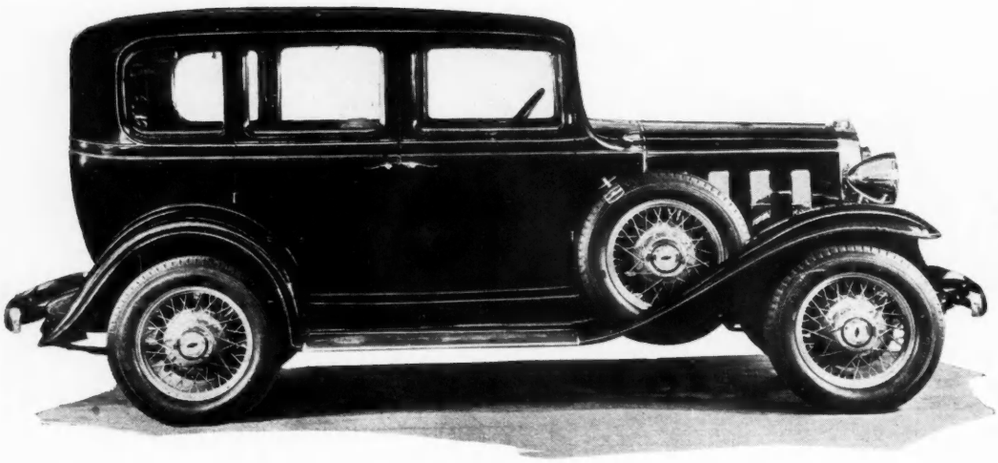
Looking Ahead Into 1932

WHICH reminds us that Prediction Time is here again. Milan V. Ayres of Chicago publicly prognosticated a motor vehicle production of 5,000,000 for 1932 at the meeting of the National Association of Finance Companies. We don't know where Mr. Ayres got his rose-tinted glasses, but we'll stake what little reputation we have left as a prophet that he's wrong by a wide margin.

R. H. Grant, G.M. vice-president, thinks that 2,000,000 passenger cars will be sold next year and that G.M. will sell 45 per cent of them. If Mr. Grant is right, there isn't going to be much improvement in business next year, as 1931 domestic sales of passenger cars will total more than 1,900,000 while world passenger car sales this year will exceed 2,100,000.

We were rather forced into the predicting business ourselves a few nights ago when we talked at a meeting of the Traffic Club of the Trenton (N. J.) Chamber of Commerce. Our guess was that 1932 sales of cars and trucks have a very good chance of equaling the sales of 1930 when car sales throughout the world reached 2,967,000 and truck sales throughout the world were 567,000. We are optimistic enough to believe also that there is at least a possibility of exceeding 1930 figures in 1932 by a slight margin.

Well, there are three guesses for you. We'll record others as they come along. You've paid your money and can take your choice.—N. G. S.



Chevrolet special sedan

Flood-Tide of New Engineering Ideas

by A. F. Denham

SYNCHRO-MESH transmissions, selective free wheeling in all forward speeds, visorless, sloping windshields, new front-end appearance and structure, 20 per cent more horsepower, downdraft carburetion, pressure lubrication, a counterweighted crankshaft, a new system of cushioned engine mounting, an intake silencer, a more rigid frame, improved axles, clutch and universal joints, larger tires on smaller wheels, hood ventilator doors instead of louvres, cowl ventilators, and "thin-wall" bearings are among the new features of the 1932 line of the Chevrolet Motor Co.

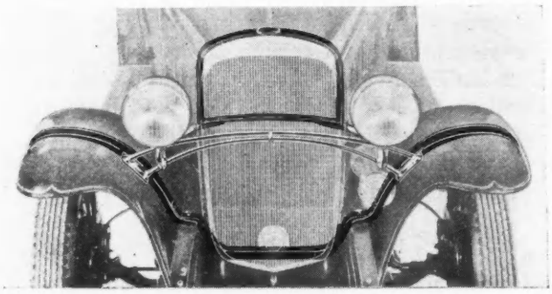
In spite of the long list of refinements and additions made, the basic design remains unchanged, and it is understood that prices also will remain at the 1931 level. The new cars, however, represent a decided advance over the previous line from the standpoints of performance, comfort, reliability and appearance.

Since there are so many changes on the 1932 Chevrolet, perhaps the best thing to do will be to take the car, unit by unit. In the engine we thus find:

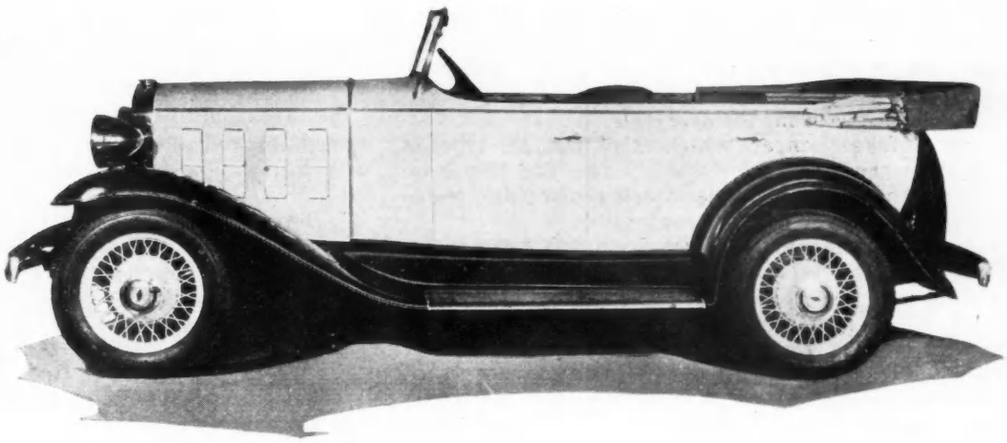
1. Increased valve lift.
2. New valve timing.
3. Downdraft carburetor.
4. Intake riser added.
5. Heat control on manifold.
6. Higher compression ratio.
7. Air dome on fuel pump.
8. More rigid crankcase.
9. Thin-wall main bearings.
10. Larger diameter main bearings.
11. Counterbalanced crankshaft.
12. More sensitive harmonic balancer.
13. New rubber engine mounting.
14. Improved valve springs.
15. Intake silencer combined with air cleaner.
16. Quieter new four-bladed fan.
17. Increased oil-pump capacity.
18. Pressure feed to main and camshaft bearings and valve stems.
19. Improved oil seals.
20. Improved water distribution around exhaust valves.

Incorporated in the downdraft carburetor is a split choke valve to prevent overchoking and loading up the manifold. An accelerating pump is fitted to the carburetor along with the customary features of Chevrolet carburetor design. The manifold heat control is for easier starting and is operated by a button on the dash. The intake riser in the manifolding serves to protect the carburetor against heat from the exhaust manifold, and is an additional protection against vapor-lock, although it is mainly intended to increase the volumetric efficiency.

Crankcases and blocks have been stiffened by the addition of external ribs and by increasing the metal thickness, particularly at the front end. The thin-wall main bearings permit an increase in crank-



Phantom view of new front-end structure showing how fenders, radiator shell, headlamps, etc., are tied together



Chevrolet phaeton

Launches the 1932 Chevrolet Line

Body and soul, the 1932 Chevrolet espouses scores of engineering changes which defy two-fingered mathematics when trying to summarize its improvements: 20 on the engine, 8 on the springs and frame, 18 on the body, and 18 more of a general structural character partially complete the list.

shaft bearing diameter without increase in the outside diameter of the bearing shells, but the main feature of the new bearings is that, owing to their thinness, they seat better in the bores in the crankcase, thus insuring improved cooling. Since the bond between the babbitt and the shell is along the neutral axis of the bearing, any tendency toward flexing of the bearing will not affect the bond.

Dowels to locate the bearings are integral with the shells, being stamped into them after the bearing is formed. The thinner flanges with larger thrust area increase the life of the center bearing.

Counterweights are forced on the crankarms adjacent to the three main bearings. Crankshafts are now forged with all crankpins in position, thus eliminating twisting operations after forging.

Increased mass in the flyweight of the harmonic balancer increases its effectiveness in the higher speed range. The four mounting points of the powerplant are arranged in the form of a diamond. At the front the engine bolts pass through two cast brackets incased in molded rubber, housed in a stamping which bolts to the under side of the front cross-member. Owing to the close spacing of the bolts this mounting functions as a single point of support.

At the rear end of the engine there is a rubber mounting at each side of the clutch housing, attaching to its forward face. Here again forged brackets incased in rubber are inclosed within stamped metal housings, bolted to the rear engine support cross-member. At the rear of the transmission and over-running clutch there is a fourth mounting which serves chiefly to take some of the load from the two main rear engine supports. It consists of a steel strap with rubber vulcanized to both upper and lower surfaces, spacer bushings slightly below the rubber surfaces, and a support plate below the lower rubber. When bolted to the over-running clutch housing, the rubber is compressed to the thickness predetermined by the length of the spacer bushings. Space for shims is provided between the legs of the support strap and the cross-member to which it bolts to permit of properly locating the rear of the powerplant.

Instrument panels on the 1932 Chevrolets carry a heat control button in addition to former instruments. Note the ash receptacle over the center of the panel + +

This arrangement, which permits a limited amount of horizontal movement at the front end of the crankcase and a slight rocking motion at the rear end, is said to be particularly effective in isolating engine vibrations from the frame.

The intake silencer, which is of the AC type, is tuned to the manifold system. The fan has been rendered more silent by stamping the trailing edges of opposite blades to different widths.

Although the lubricating system has been materially changed, the vane-type pump is retained, but its delivery and its pressure are increased. It delivers oil to a distributor at the left side which is provided with a spring-loaded regulator valve as formerly. From the high-pressure side of this valve connections lead to the pressure gage. From the low-pressure side connections lead to the valve rocker shafts and to the connecting-rod dipper troughs.

The center main and camshaft bearings are lubricated directly by a lead from the pump, while distributing lines from there provide lubrication for other main and camshaft bearings.

A metering groove is provided in the rocker arm bushing to prevent over-oiling of the valve stem and upper end of the push rod. A hole is provided at the top of the rocker arm hub toward the push rod side through which oil is fed, maintaining an oil supply at the push-rod socket for quiet operation, and also to produce a mist through the socket action to lubricate other parts of the valve mechanism. With the adoption of this semi-pressure system of lubrication, oil seals have been improved to prevent leakage.

In the clutch the major improvements are:

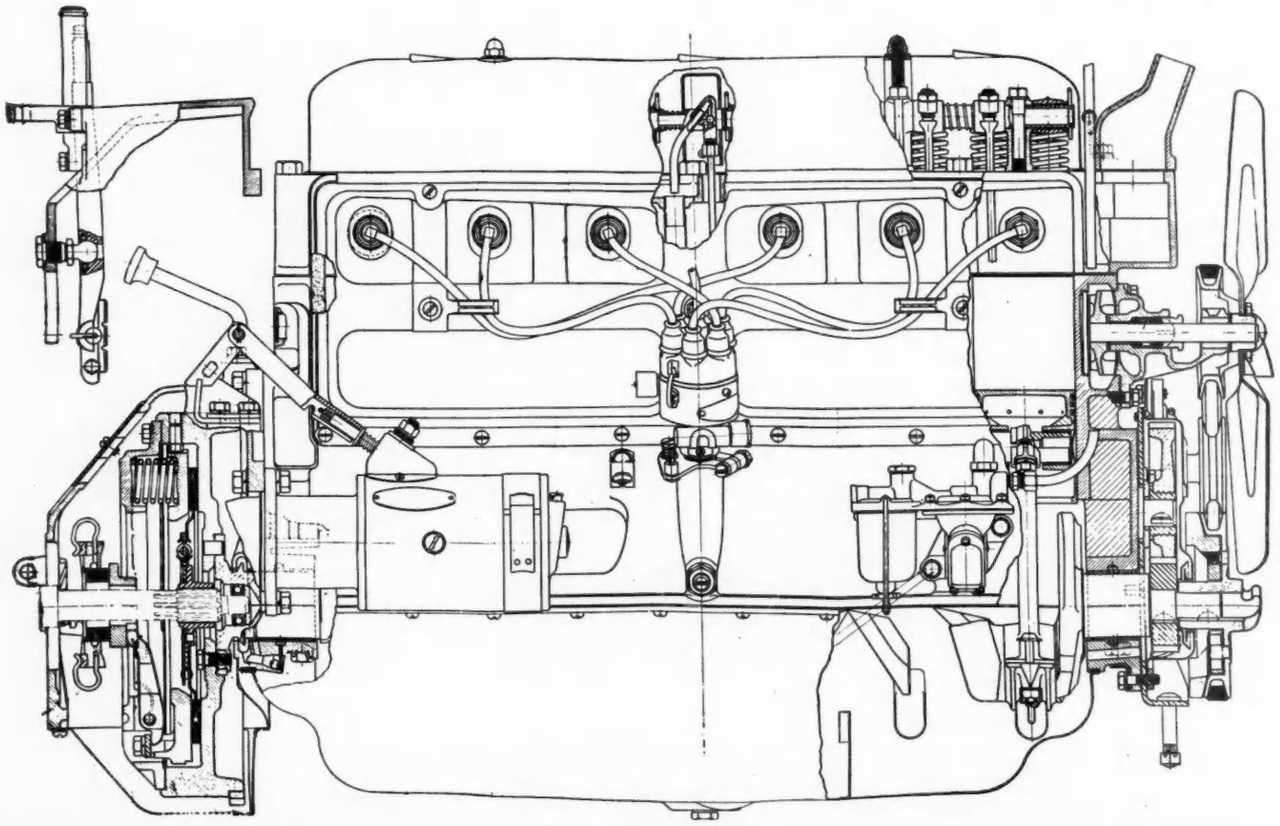
1. Use of three fingers instead of four.
2. Nine clutch springs instead of eight.
3. Provision of torsion springs on pressure levers.
4. Improved release bearing lubrication.
5. Spring-mounted cushion clutch disk.

Two torsion springs are used at each lever to prevent rattles. The throwout plate has a universal mounting on the pressure levers to prevent misalignment and reduce friction. Three levers are used since three points are sufficient to determine a plane, and localization of disengagement pressure is thereby prevented. The clutch fork is mounted on a spherical swivel retained by a snap ring in a spherical stamping as an insurance against misalignment of the release bearing.

The latter, mounted at the inner end of the fork on a pair of trunnions, is made of carbon-graphite composition, contained in a shrunk-on collar. The face of the release bearing is grooved to present more surface for the seepage of lubricant, and provide for the clearing off of small particles of carbon which may wear off the bearing surface and otherwise produce squeaks. An oil reservoir formed by a groove in the bearing collar, with an oil cup for replenishing, is accessible through the inspection hole in the clutch housing.

A change from eight to nine springs is due to the

Sectioned side elevation and cross section of Chevrolet powerplant, showing details of front-end drive, engine front mounting, clutch, etc. + + + + + + + +



change in number of levers, there now being three springs between levers. The clutch disk is cushion-mounted at the hub through eight springs.

The transmission is entirely new. The synchronizers are similar in design to those used on other General Motors cars, being of the bronze cone-clutch type, with energizing cams on the fingers mounting the female members on the spline shaft. These cams are really chamfers cut on the support arms which intended to prevent engagement of the gears before they have been brought to the same speed. Of course, second speed gears are of the constant mesh type in this transmission, and engagement is effected by a sliding toothed member on the transmission main shaft.

To insure contact between the sliding member and the cams on the synchronizing drums—in other words, to prevent engagement of the gears before sufficient time has elapsed for synchronization—"detent" springs are used. As the sliding member moves toward engagement, it first encounters these springs, which serve to square up the synchronizing drum and start the pressure against the external cone of the gear to be engaged. This is just enough to cause the drum to rotate sufficiently to bring the servo cams, or chamfers, into contact with the ends of the teeth on the sliding member. The detent springs are in the form of annular rings with leaf springs. An undercut at the end of the sliding members permits the latter to slide over these springs to complete the engagement.

A higher reduction ratio has been provided for the second speed gears, to facilitate starting up in this gear from a standstill. Low speed and reverse ratios on the other hand have been lowered so that higher speeds are available in these gears.

A Hyatt roller bearing is used at the front end of the main shaft and New Departure ball bearings at the rear end. Gear faces are wider than previously. The shifting mechanism incorporates an interlock to insure against movement of both forks at the same time. The case is filled with lubricant to a filler hole located so as to submerge countershaft and idler shaft and gears.

The over-running clutch or freewheel unit (manufactured by Chevrolet) consists essentially of three parts, a front and a rear cup, and a square-section coiled spring within the two cups. The forward cup is the driving unit and is splined to the transmission main shaft. The rear cup is splined to the front yoke of the universal joint. To the latter the coiled spring is attached by an integral prong at the end of the spring. A Hyatt solid roller bearing maintains alignment of the driving and driven members. As power is applied by the engine, the spring, which is fitted with very little clearance, expands tightly into the cups of both members, thus transmitting the drive. That is, the spring tries to unwind. When the driving force is removed, the driving spring contracts, releasing the cups which are then free to rotate relatively to each other.

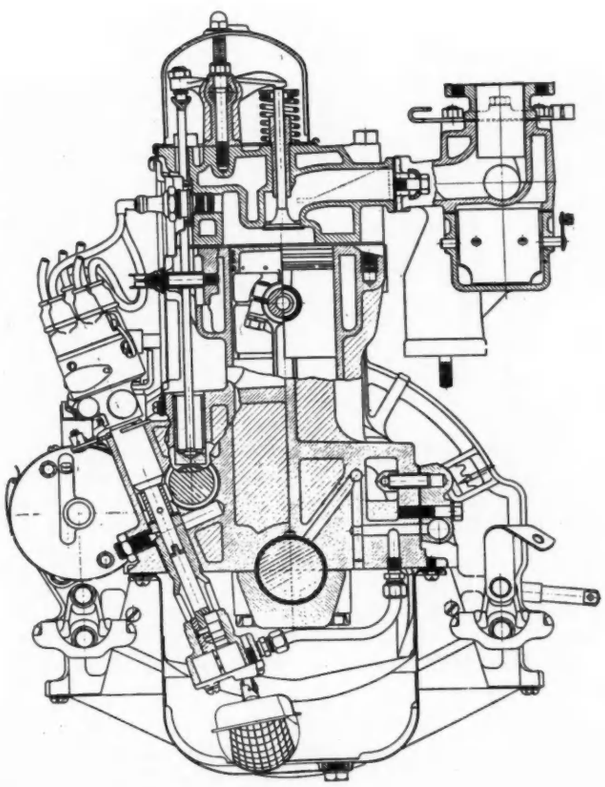
A sliding sleeve riding on splines on the

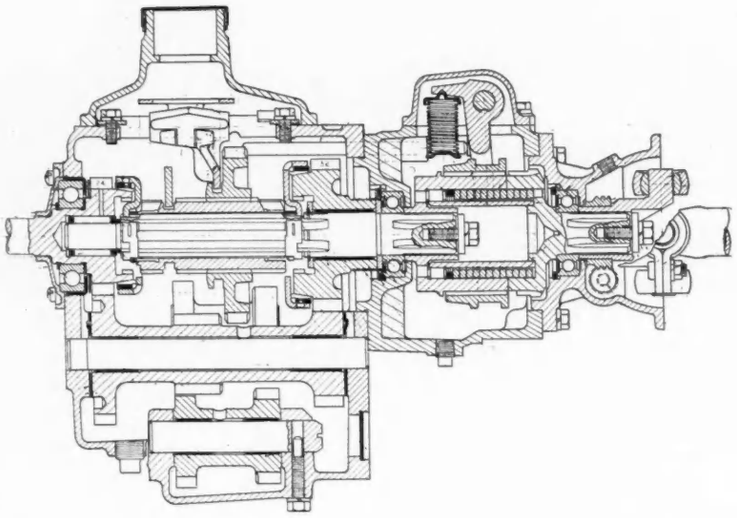
1932 Chevrolet Specifications

Items specifications that have been changed:

	New	Old
Max. horsepower	60-3000	52-2600
Max. torque, lb.-ft.	130	124
Crankshaft counter-weighted?	Yes	No
Crankshaft weight	53 lb.	48 lb.
Front bearing dia.	2.059	1.937
Center bearing dia.	2.121	2.000
Rear bearing dia.	2.184	2.062
Conn. rod bearings	spun in	die cast
Lubricating system	semi-press.	splash
Average oil pressure	14 lb.	11 lb.
Intake valve opens	4°BTDC	4°ATDC
Intake closes	34° late	42° late
Compress. ratio	5.2	5.00
Rocker arm ratio	1.460	1.306
Valve lift	.309 in.	.277 in.
Carburetor type	downdraft	updraft
Man. heat control	Yes	No
Intake silencer	A.C.	none

	New	Old
Fan type	4-blade	2-blade
Engine mounting	4-pt.	3-pt.
Type	rubber	solid
Clutch springs, No.	9	8
Clutch damper	springs	none
Transmission ratios		
Low	3.17	3.32
2nd	1.82	1.77
Reverse	3.57	4.2
Countershaft	one-piece	built-up
Pilot bearing	Hyatt	bronze
Frame cross-members	5	4
Front spring camber	15/16	11/16
Axle shaft dia.	1.575	1.378
Wheel bearing bore	1.575	1.378
No. of balls	14	11
Ball dia.	7/16	17/32
Headlamp lens dia.	8-11/32	9-1/16





This sectional view of the transmission shows details of the new free-wheeling unit and of the synchro-mesh clutches + + +

front cup is meshed with splines on the rear cup to lock out the over-running clutch. The free-wheeling unit is automatically locked out for reverse engagement and returns to free wheeling when the gear-shift lever again engages a forward speed gear. Disengaging of the clutch after bringing the engine up to car speed is recommended by Chevrolet when locking out the free-wheeling unit.

While the universal joint is of the same general design, it is now being shipped assembled from the parts factory. The front yoke now carries six splines instead of being square for better alignment of the connected parts.

In the rear axle the shafts and wheel bearings have been increased in size. A leather packing cup replaces the former cork oil retainer on the inner side of the bearing. Spherical-head rivets have been developed for fastening the ring gear to the differential case. These fit into countersunk holes and are intended to provide additional protection against loosening of the joint. Axle spring seats and caps have been lengthened 7/8 in. to reduce wear. Steering tie rods now carry anti-rattle springs of square section.

Frame and Springs

In the frame the major changes are as follows:

1. Double channel front cross-member.
2. Transmission support cross-member added.
3. Battery hanger mounted on transmission cross member.
4. Brake cross-shaft brace mounted on transmission cross-member.
5. Improved front spring rear hanger mounting.
6. Cone head rivets in rear-spring front hanger.
7. More rigid third cross-member and brackets.
8. Stronger body brackets.

Much of the front-end stiffening, together with the new cross-member, is to offset the decrease in frame bracing produced by the adoption of full rubber mounting for the powerplant. Spring hanger supports are stiffened by stamping a groove in the side rail web on each side of the bracket. Chevrolet engineers state that the new frame is as stiff torsionally as the 1931 series in spite of the use of rubber engine mounts.

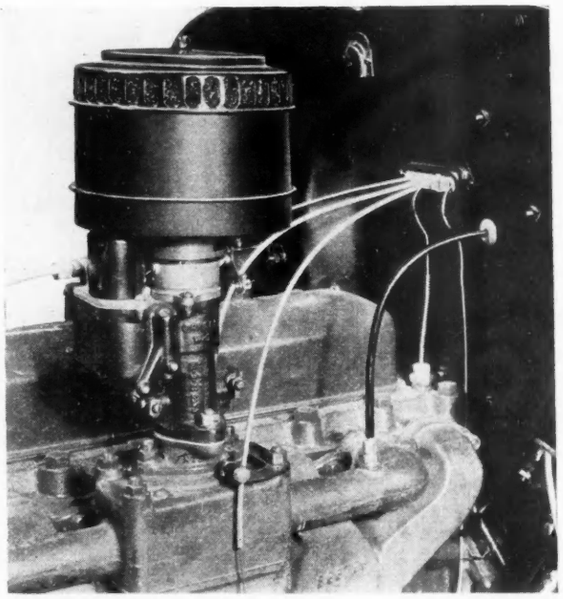
During the 1931 season the camber and load-carrying capacity of the front springs were increased. Locks for all spring shackle bolt nuts have been improved by the addition of a stamped depression at the point where the lock contacts the hexagon of the nut, to prevent the nut from moving out of engagement with the lock when the tension spring is deflected sufficiently to permit the nut to leave its seat.

A more secure muffler tail pipe mounting is obtained by the addition of a supporting leg at the clamp end. An integral triangular wedge key grips the tail pipe when clamped in position. At the point of attachment to the exhaust manifold, the conical flange is now riveted to the exhaust pipe.

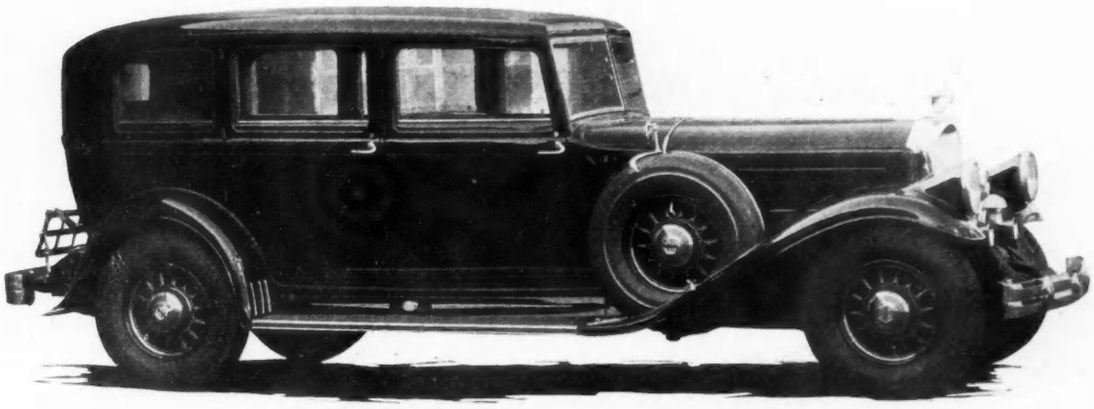
Gasoline gages are now of the single cork float type mounted on a pivot well down in the tank. A pair of gears translate the vertical motion into rotary motion of the vertical shaft. A friction disk is located at the lower end, and a spring-mounted contact at the upper end to prevent "flickering." A baffle plate is also added in the tank to increase gage accuracy and to reduce surging.

All controls to the engine compartment pass through a single rubber block in the dash, including the oil pressure-gage and temperature-indicator tubes.

(Turn to page 896, please)



Downdraft carburetors are partly responsible for the improved distribution and higher horsepower developed in the Chevrolet engines + + + + + +



Pierce-Arrow inclosed drive limousine

Pierce-Arrow Enters Two New Twelves in 1932 Market

TWO 12-cylinder models will be offered the public by the Pierce-Arrow Motor Car Co. of Buffalo, N. Y., for the 1932 season, known respectively as the Model 53 and Model 52. The former has an engine of 3¼ in. bore by 4 in. stroke, and the latter an engine of 3⅜ in. bore and 4 in. stroke, the piston displacements of the two models being 398 and 429 cu. in. respectively. The angle between the two banks of cylinders of the V engines is 80 deg. The engines have a compression ratio of 5.05 to 1 and are rated at a normal speed of 3200 r.p.m.

Pistons are of the invar-strut, split-skirt, aluminum-alloy type; they are 4 in. long and carry three compression rings and one oil-control ring. Piston pins are ⅞ in. in diameter and 2¾ in. long. The pins are of the floating type. Connecting rods are drop-forged of carbon steel and have a center-to-center length of 9.936 in. The "big-end" bearings are 2.1265 in. in diameter and 1.12 in. long.

The crankshaft is supported in seven main bearings, all of which are 2.49 in. in diameter. Main bearing lengths of the engine are as follows (front to rear): 1¾ in., 1¼ in., 1¼ in., 1⅞ in., 1¼ in., 1¼ in., 3 7/16 in. Camshaft drive is through a toothed chain of ½-in. pitch and 1½-in. width, the chain having 53 links. A vibration damper is fitted.

Intake valves are made of chrome-nickel and exhaust valves of silicon-chromium steel. The former have a head diameter of 1 21/32 and the latter of 1 9/16 in., and the lifts of both sets of valves are 5/16 in.

Lubrication is by the pressure system to main, connecting-rod and piston-pin bearings. The camshaft bearings also receive oil under pressure, and the timing gear is positively lubricated. An oil gage of the bayonet type and an outside oil filter are provided, and the oil pressure is indicated by a gage on the dash. Chassis lubrication is by grease gun and magazine oilers. The crankcase is ventilated.

The rear-mounted gasoline tank has a capacity of 30 gal. Fuel feed to the carburetors is through a Stewart-Warner camshaft pump, combined with fuel filter. Two Stromberg 1¼-in. carburetors are fitted and provided with AC air cleaners.

The radiator is of the fin-and-tube type, and manufactured by the Long Radiator Co. The fan is driven by a V belt.

Ignition is by a Delco-Remy unit with 12-deg. automatic and 30-deg. manual advance. The spark plugs are of the 14-mm. metric type. A Willard 160 ampere-hour storage battery is standard equipment and has its positive terminal grounded. Starting is through a Bendix drive, with a gear ratio between starter pinion and flywheel ring gear of 11.2 to 1. Both the generator and starter are of Delco-Remy make. The generator is driven by a double V belt. Headlight control is by the use of double bulbs. A Delco-Remy horn is provided.

The clutch is a single plate Long, with molded asbestos facing of 6¼ in. inside and 9¾ in. outside diameter, the thickness of the facing being 0.13 in. The transmission is of the company's own make and affords three forward speeds and one reverse. Gear ratios of the three forward speeds are 2.83 to 1, 1.70 to 1 and 1 to 1, respectively. Spicer universal joints are used in the open propeller shaft and the torque is taken on a torque arm.

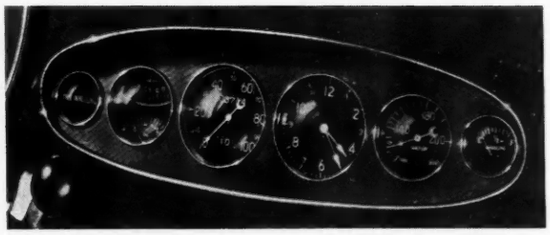
The rear axle is of the semi-floating type. With tires fully inflated the clearance under the axle is

(*Turn to page 873, please*)

Roomier Bodies, Longer Wheelbases

The aerodynamic body design is accentuated by inclined windshields and windshield pillars

Increased silencing of engine, which is larger, automatic spark control, helical gear synchro-shift transmission, shatterproof glass and visorless windshield are among the new Studebaker features + + + + + +



This shows the simplicity characteristic of all Studebaker instrument panels. This one, on the President, carries a clock. Note the indicator at the left to show whether or not the car is in "free wheeling" position + + + +

INCREASED wheelbases, longer and wider bodies of new design with sloping, visorless windshields, pillars, etc., free wheeling in all forward speeds combined with a helical gear synchro-shift transmission, "cushioned power," automatic starting, "automatic ride control," combined vacuum and engine-speed automatic spark control, metal spring covers, increased silencing of engine and bodies, shatterproof glass all around at no additional cost, counterweighted crankshafts in all engines, greater insurance against brake lining replacement, and a larger engine in the Studebaker six.

These are the main features of the 1932 Studebaker line, which will probably carry lower prices, although prices have not been definitely determined at the time of writing. There are also several new body models added to the line, among which are a convertible sedan and a convertible roadster-coupe on each of the four chassis, and a new brougham which is remarkable for the ease of entrance into both front and rear compartments through the single door on each side.

This close-coupled, five-passenger model, also found on all chassis, has one of the widest doors found on any car today, the door extending from the front pillar, where it is hinged, to a point midway between the back of the front seats and the front of the rear cross seat.

Studebaker engineers claim an increase of 1½ to 3 m.p.h. in top speed that can be credited to the streamlining of the cars. The most marked performance increase, of course, is on the Studebaker six, the engine of which has a ½ in. longer stroke; the 25 cu. in. increase in displacement is credited with raising the horsepower by ten to a total of 80 at 3200 r.p.m. The compression ratio, it will be noted, has been lowered slightly.

Cars are slightly lower than formerly, mainly by virtue of the adoption of 18 in. wheels in place of the former 19 in. This, however, is offset to some extent by larger tire sections. Increase in tread is mainly responsible for the increased body width. Seats, both at the cushion and at shoulder height, are from 2 to 3 in. wider than formerly.

Seat widths have been standardized for all cars. Both front and rear seats are 48½ in. wide at the

Are Molded Into "Aircurve" Lines on New Studebaker Bodies

cushion, while the front seats are 53 in. wide at shoulder height and rear seats 55 in. at the same point. Starting with these dimensions, the width of tires and the required skid-chain clearance gave the wheel tread required, which varies for the different models.

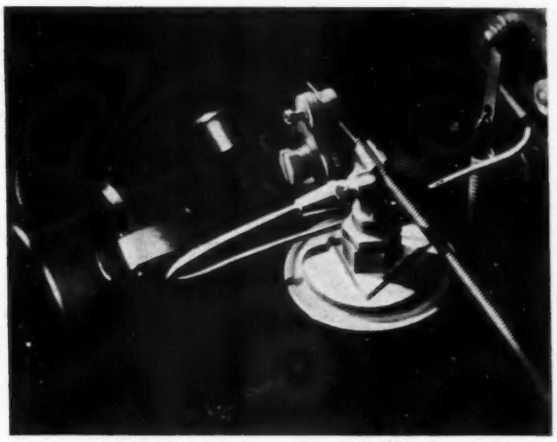
For the Studebaker six and Dictator the rear tread is 60 3/16 in.; for the Commander it is 61 in. and for the President, 61½ in., the widest tread used on a standard production automobile at the present time, it is believed. The front tread is 59 in. on all models.

To permit of increasing the body width without too great an increase in frame width, the body sills are carried on outriggers along the neutral axis of frame side-members, as in the Pierce-Arrows, recently announced. This makes for lower sill height, and with sills having the grain running vertically at the points of support for increased strength.

Wheelbases have been increased 3 in. on the Studebaker six and Dictator eight, and 1 in. on the Commander, while the President now comes in a single wheelbase of 135 in. as against the two former wheelbases of 130 and 136 in.

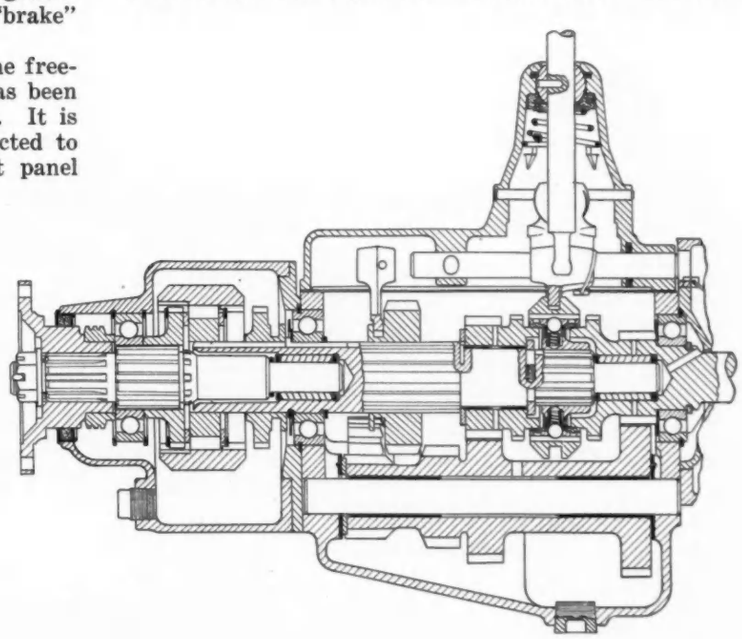
Free wheeling, largely pioneered by Studebaker in this country, has been improved by locating the unit at the rear of the transmission, where it is effective in all forward speeds. The unit is of the latest Warner-Gear type with a single roller for each cam. This change has made possible the adoption of synchronizing cones for second-speed and direct-drive engagement, these also being of the now familiar Warner-Gear construction, with spring-loaded ball and groove locks providing the cone pressure necessary to "brake" the gears to be engaged to the correct speed.

Reverse engagement is double acting from the free-wheeling position, while the lock-out control has been removed from the gearshift lever to the dash. It is now in the form of a push-pull button connected to a Bowden wire. A gage on the instrument panel indicates whether the car is in free wheeling or in the conventional drive position.

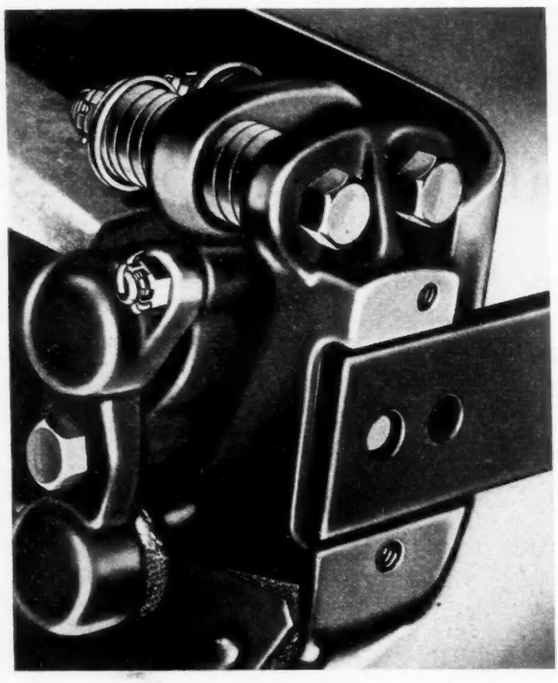


Auxiliary spark advance control retards the spark about 6 deg. when accelerating at full throttle to prevent detonation and increase smoothness. It is controlled by manifold vacuum through a spring-loaded diaphragm + + + +

All powerplants are now mounted in rubber at all four points, the mounting being of the semi-elastic type so as to permit some side motion of the crankcase, especially at the front end. The mounting for the six-cylinder engine is somewhat freer than that



Sectional view of transmission, showing the synchronizing clutches between intermediate and high gears and the free-wheeling unit at the rear



Kick shackles have been retained on all Studebaker cars. Note how the doweling of the front bumper cross bar gives a cross-member effect and helps in bracing the frame + + + + +

on the eight, and includes a "torque arm," cushioned in rubber, extending from the rear of the crankcase to the frame side-rail.

With the freeing up of the engines to a considerable extent, pedal controls are now mounted on the frame to prevent transmission of vibration to the car body. Insulation of bodies generally has been improved. A sponge rubber mat is now used below the front compartment mat, for instance. Both upper and lower body panels carry insulating material.

Powerplant changes, aside from those involved in the increased stroke of the six, include the adoption of tin-plated cast iron pistons on the six and Dictator eight, Bohnalite pistons being retained on the two larger eights. Bearing sizes have been increased on both the six and the Dictator. A two-point chain is now used on the six. Valve stem diameters have been increased to 11/32 in. on all engines for decreased stem wear, etc. Startix has been adopted as standard equipment on all engines; generators have been speeded up to compensate for the loss in charging rate while free wheeling.

In addition to the automatic advance controlled by engine speed, a device for advance control by manifold vacuum has been added, which retards the spark while idling, and particularly during acceleration with wide open throttle. With the throttle open completely the lowered manifold vacuum enables a spring-loaded diaphragm to retard the spark about 6 deg. thus reducing the tendency to detonation under these conditions. When the throttle is partly closed once more the distributor is returned to its normal advance position again by the increase in manifold vacuum.

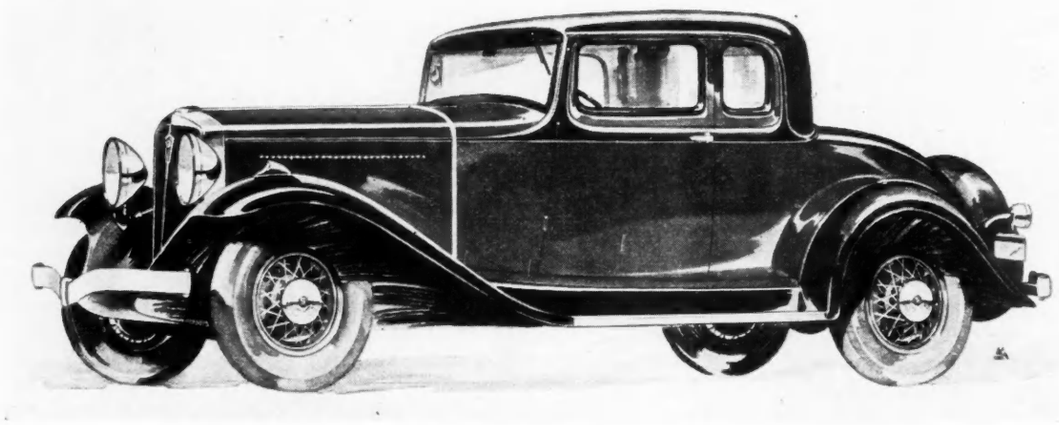
Steel-backed main bearings are now used by Studebaker throughout. Dictator and Commander eights now carry eight integrally forged counterweights on the crankshaft, while the six and President crankshafts have four counterweights, separately machined and bolted to the shaft. Lanchester vibration dampers have been improved in detail.

On the six, bearing sizes have been increased. They are all 2⅛ in. in diameter with the following lengths (front to rear): 3⅝; 1⅝; 1⅝; and 3 1/32. Opening of the intake valve occurs 2 deg. later, at 5 deg. after upper dead center, on the six. On the Dictator, main bearings are 2 11/32 in. in. diameter with lengths of 1⅜, 1¼ and 1 7/16 in. for the front, center and rear bearings respectively. All six intermediates have lengths of 1 in. On this model an AC air cleaner is now used.

The Commander now also carries an AC air cleaner, the President an Air Maze. Improvements have been made in the "full power" Burgess muffler and intake silencers on the various cars.

Battery capacities have been stepped up to 102 amp. hr. on the six and generator speeds have been increased on all cars to make up for induction in engine revolutions due to free wheeling.

A new single-plate clutch is found on the President,



New Dictator Eight Coupe for either two or four passengers

replacing the former two-plate type. It is, of course, of larger diameter and it has the same spring cushioning device as the former clutch.

The rear-axle ratio has been changed from 4.73 to 4.27 to 1 on the six, in view of the increased power. Wheels are smaller on all models, 18 in. drop-center types being used, as against 19 in. formerly. De luxe models carry six chromium-plated steel-spoke wheels. On the Studebaker six and the Dictator eight tire sections have been increased from 5.25 to 5.50 in. Six-ply tires are used on the Commander and President eights.

In the braking system, lining thickness has been increased to ¼ in. on all models, to allow for increased wear resulting from higher type speeds and free wheeling. Drums are heavier and of better-grade steel.

Spring covers are standard equipment, as are new Houdaille shock absorbers, on all models. On the six and Dictator these shock absorbers are of the normal double-acting type, while on the Commander and President they are referred to as "automatic ride control." These latter shock absorbers have both thermostatic and dynamic controls to produce a widely increased range of action for a single setting. The thermostatic control is said to have a range of from 20 deg. below to 125 deg. above zero.

Insulating materials have been applied to all body and door panels, floor boards, and in the roof construction. Dashboards are insulated on both sides.

With the adoption of the aerodynamic windshield, front pillars are now also of the sloping type. Windows are shallower than formerly, for better balanced appearance with the lower overall height of the cars. Hood latches are of the concealed type. An adjustable visor is provided for the driver.

The radiator design for 1932 has a more pronounced wedge-shape and a sharper slope toward the bottom where it merges into the front splash apron. De luxe models carry dual chromium-plated outside mounted horns, trunk racks and ornamental radiator caps. The new broughams are provided with trunks as standard equipment.

There is a new tail light on all cars, incorporating a "reflex" type glass which warns the driver approaching from the rear, even if the bulb should be burned out. Broadcloth or mohair upholstery are optional, with leather standard in all convertible models. Front seats are adjustable in all except convertible sedans. All closed models are wired for radio.

Instrument panels are simple in design, and carry clock-face type larger instruments. The electric gasoline gage can be read with the ignition off by depressing a button. Automatic windshield-wiper motors are mounted inside. President models carry clocks and cigar lighters. All sedans and broughams have dual ash receivers in the rear compartment.

In the St. Regis brougham there is an ingenious sliding arrangement for the right-hand front seat, which provides additional entrance room to the rear compartment with the door open. This seat is so arranged that "hitching" it forward slightly also inclines the seat back forward several degrees.

Seat backs are higher on nearly all models; an increase in leg room has resulted from lengthening of the wheelbase. Front doors are now wider below the window sills, thus facilitating entrance to the front compartment.

Pierce-Arrow Enters Two New Twelves

(*Continued from page 869*)

8¼ in. Final drive is through hypoid gears. There are 12 teeth in the pinion and 53 in the differential ring gear, so the final reduction ratio is 4.42 to 1. Adjustment of the pinion bearing is by means of shims. Tires are of the six-ply type and designed to carry an air pressure of 40 lb. per sq. in.; their size is 18 by 7 in. Dunlop-type drop-center rims of 18-in. diameter and demountable wood wheels are standard equipment.

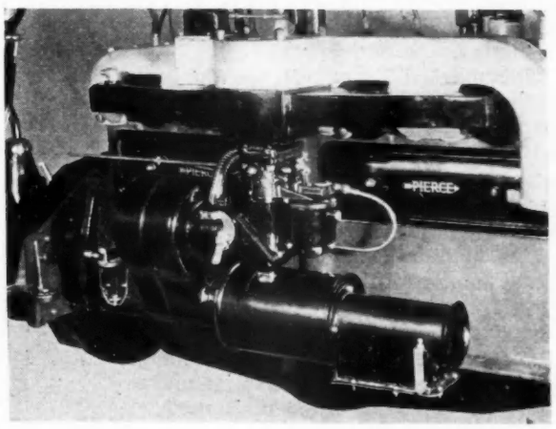
All springs are of silico-manganese steel. Front springs are 38 in. long by 2 in. wide and have 11 leaves; rear springs are 61 in. long by 2½ in. wide and have nine leaves. Fafnir ball-bearing shackles are used all around.

The steering gear is of the Ross cam-and-lever type.

Bendix mechanical four-wheel brakes are used. Brake drums are 16 in. in diameter and brake shoes are provided with molded asbestos linings. The total braking area is 291 sq. in. and braking effort is equally divided between front and rear brakes. The hand brake lever acts on the same four brakes as the pedal.

The frame side channels have a maximum cross section of 8 by 2½ by 0.156 in. Model 53 is made in two lengths of wheelbase, of 137 and 142 in., respectively, and model 52 also in two wheelbases, of 142 and 147 in., respectively. At the front the tread is 59½ in. and the rear, 61½ in.

In the 1932 line of Model 54 Pierce-Arrow cars the intake silencer used is manufactured by the AC Spark Plug Co.

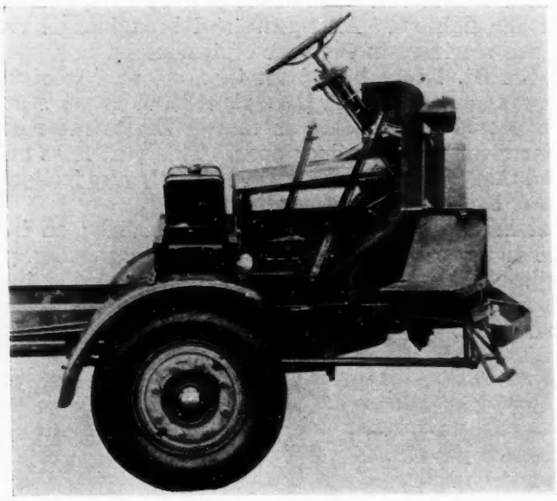


Pierce-Arrow uses AC intake silencer

Eighteen Truck Lines Offered With

An increased number of six-wheel chassis with single axle drive, several models with the engine well in front of the forward axle and the wide adoption of the triple servo brake system are conspicuous developments noted at the Olympia Truck Show + + + + + + +

by M. W. Bourdon



The Garner six-wheeler has the engine set forward of the front axle + +

AT the truck and bus show at Olympia, eighteen British makers are offering oil engines as an alternative to the standard gasoline engine; at the previous show, held in 1929, not one British maker was prepared to supply an oil engine, though a few foreign makers—Saurer, Berna and Mercedes-Benz, for example—then showed oil-engined models. Twelve months ago only A.E.C. and Crossley were offering an oil engine.

This marked increase in the number of oil engines is an outstanding feature of the present show. Other high spots are an increased number of six-wheeled chassis mainly for heavy trucks, additional six-wheelers with single-axle drive, four makes of truck chassis with the engine in front of the front axle (only one, Commer, hitherto); popularity of the triple servo (vacuum) system for heavy vehicle braking; use of nichrome cast-iron alloys for brake drums and the clear evidence that British manufacturers have been devoting their main efforts to the development of chassis of more than 4 long tons capacity.

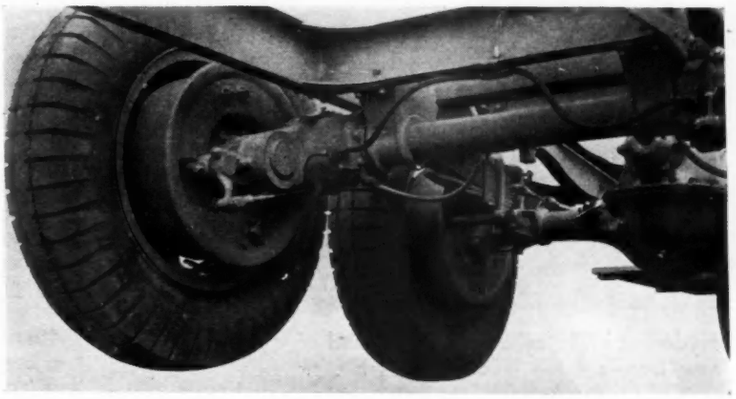
Four of the eighteen makers showing oil engines are firms who have hitherto specialized in steam trucks or truck-tractors but have lately produced oil-engined trucks as a new line. Among the recognized truck and bus makers, only Crossley and A.E.C. have been in production with oil engines for any length of time. Dennis, Leyland and Thornycroft have introduced designs of their own; Gilford is using a Junkers two-stroke, while Guy, Pagefield and Tilling-Stevens, among others, are using one of the Gardner designs which are developed from marine oil engines.

The smallest of the oil engines offered is the four-cylinder Gardner (4¼ by 6 in.); the largest is the six-cylinder Fowler (4.73 by 7.09 in.). The smallest passenger chassis available with an oil engine is the A.E.C. "Ranger" for 26-seated coaches and buses, and the smallest trucks are four-ton types (Pagefield and Tilling-Stevens). The majority of oil-engine trucks are of load capacities ranging from 6-ton four-wheelers to 12-ton six-wheelers.

By no means all the new oil engines are comparable in regard to crankshaft speed with the A.E.C.-Ricardo; this engine runs up to 3000 r.p.m. under normal conditions, whereas the majority of other makers have their maximum speed between 1200 and 2000 r.p.m. There is considerable difference, too, in power-to-weight ratio, which ranges from just 10 lb. per hp. to 20 lb. per hp. In all cases the fuel used is a light gas

The linked rear springs of the six-wheel Garner with single axle drive is shown here with wheels removed + +

Oil Engines at London Show



Rear suspension (Longframe system) on the new Leyland six-wheel truck with single axle drive + + + +

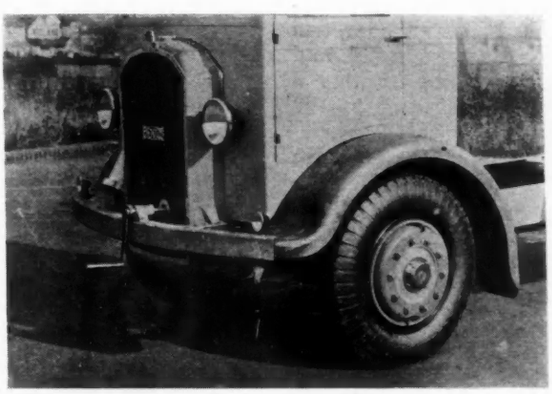
oil with a specific gravity of .865-.875. Divergent practice is similarly evident in combustion chamber design; A.E.C. uses an antechamber with injection at the top of the chamber, and Dennis and McLaren use an air cell on the cylinder head with injection from below into the throat of the cell. Fowler has an air-cell in the piston crown with three oblique holes allowing air to pass to and from the combustion space; no fuel enters the cell. Leyland uses a piston with a cone-shaped recess into which the fuel is injected, and Thornycroft has a piston with a hemispherical recess at one side and direct injection. The Gardner line has direct injection with a flat piston. Compression pressures range from 12 to 16 to 1.

In all but exceptional cases the Bosch fuel pump unit and injectors are used, and all British-made oil engines operate on the four-stroke cycle. Overhead valves are universal; Leyland uses an overhead camshaft. Dennis is exceptional in providing two air valves, one over the piston and the other at the top of the antechamber, the rocker of this supplementary valve being operated by an extension of the rocker of the main air valve.

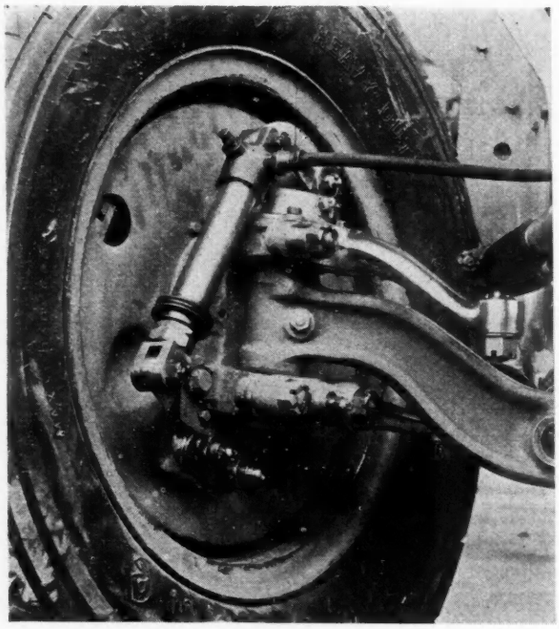
Thornycroft and A.E.C. use Elektron (magnesium alloy) instead of aluminum for the crankcase, but cast-iron cylinders are the rule, with separate sleeves in several cases. Pagefield (in a 10-ton six-wheeler) and Scammell are using a five-cylinder Gardner oil engine. Pagefield and Tilling-Stevens for 4-ton trucks use a four-cylinder Gardner; but all other British oil-engined truck and buses are sixes.

The most unorthodox British chassis at Olympia is an addition to the Gilford line, a make that has gained considerable popularity in a few years with more or less orthodox gasoline - engined single-deck buses. The new Gilford has a six-cylinder 2.75 by 8.27 in. Junkers two-cycle valveless oil engine with opposed pistons and cylinders, front wheel drive, independent springing, and bodywork single- or double-deck bus, of which the lower part forms the chassis frame. The absence of running gear under the body permits of a very low floor height. Behind the driver (who sits alongside the engine) the floor is only 13½ in. above the ground and is flat throughout. The lower compartment of the double-deck bus has a flat ceiling giving a flat floor to the upper compartment; and yet the overall height of the bus is only 155 in.

The Gilford Junkers engine develops 120 hp. at 2000 r.p.m. and has intergeared crankshafts in top and bottom crankcases. The four-speed gearset is in front of the engine, but separated from the latter by a casing containing the differential and worm drive assembly, the clutch shaft extending through a hollow worm shaft. The gearset has three trains of constant-mesh gears mounted individually on ball bearings; all gears are ground and all have a tooth width of 1⅝ in. From the worm wheel the power is transmitted to the front wheels by two short shafts with constant-velocity universals. The powerplant and worm drive casing as a unit is supported at three points, two on a large-diameter cross tube forming one of the main structural members of the front end of the vehicle, while the third, the rear, support is bolted to a bulkhead



Combined bumper, front cross-member and fender bracket of the new Dennis 4-ton truck + + + + + +



Hydraulic brake cylinder on front end of new Dennis 4-ton truck + + +

separating the engine space from the body interior. Suspension at front and rear is effected solely through Gruss air springs, with vertical guide bars at the front taking driving and braking torque. The body shell forms the main structure of the chassis to which the units are attached.

The wheel-arches provide a bridge-like construction, to which the independently sprung wheels are attached. They are built into the main body structure, the front pair being braced together by the tubular member which carries the front support of the powerplant, while the rear pair are directly connected by deep-section channel members, to which are rigidly fixed two longitudinal channels extending rearward to support the body overhang. The front and rear wheel-arches are connected by the side paneling, which, below the waist, is of sufficient thickness to make it one of the main factors of strength of the framework.

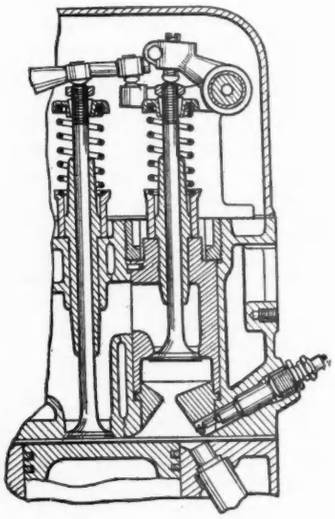
When the vehicle is fully laden, the weight is practically equally distributed between the front and rear wheels, which permits the use of single rear tires; low-pressure tires are fitted, 11.25 in. on 20 in. rims. Four-wheel braking is by the Lockheed hydraulic system with a vacuum servo assisting between pedal and master cylinder, the latter and the servo forming a unit. The operating cylinders are external to the drums and take effect upon orthodox camshaft levers.

Among the many new six-wheelers at Olympia are five with a single-axle drive and a trailing axle for the rearmost wheels; one of these, a Scammell, for 12-ton loads, has side chains for the final drive from a differential cross-shaft attached to the frame, but all the others have either worm or double reduction gear drive to the single driving axle. Garner, on a 3-ton six-wheeler of this general type, uses a system of suspension consisting of two half-elliptic springs for each rear axle with bell-crank levers and rods coupling the adjacent ends of the two springs at each side. The Danish Longframe system is used on two Leylands; there is a semi-elliptic spring at each end of the driving axle with its rear end linked to the front of a doubled-ended arm that is free to swivel on a cross tube fixed to the chassis; this arm at its rear end has a laterally projecting stub axle for the trailing wheel. A.E.C. uses single inverted semi-elliptic springs anchored by a central trunnion bearing with axles attached to it as in orthodox four-wheel drive practice.

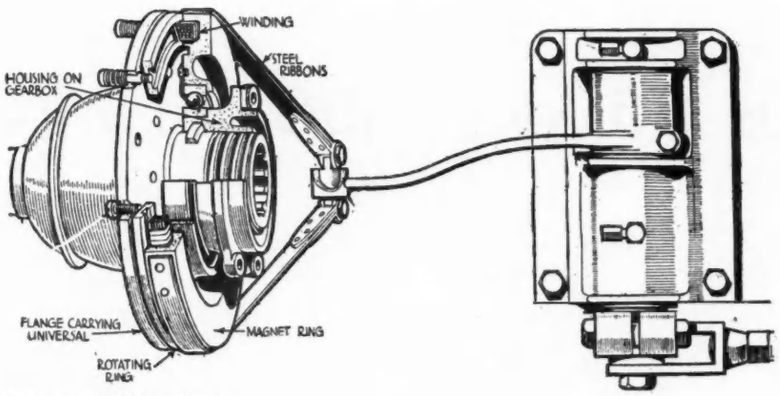
Thornycroft, Leyland and Garner have introduced new truck chassis with the engine located in front of the front axle, a feature represented in British practice hitherto only by a 6-ton Commer. This scheme is adopted in most cases as an improvement on the "beside-engine" driving position over which it has the advantage of greater engine accessibility owing to the absence of driving controls alongside the engine. But Garner uses both the forward engine and forward control in conjunction.

A notable development is the extended use that is being made of the vacuum servo for braking, with both mechanical and hydraulic operation. The majority of trucks of over 6-ton capacity and buses for 30 to 60 passengers have either two or three servos. Where two are used, the main servo, brought into operation by pedal actuation, is linked to the rear brakes, while the auxiliary cylinder, coupled to the other by a flexible vacuum pipe, takes effect upon the front brakes through a cross-shaft and linkage. Three servos are more frequently favored, each of the two auxiliary cylinders applying one front wheel brake. Clayton Dewandre, whose vacuum servo equipment is generally used, has introduced a new triple servo system in which each of the auxiliary cylinders is bolted to a platform formed on the front swivel axle, the piston rod being linked to the brake camshaft lever with provision for adjustment; this scheme has been adopted for five out of every six triple servo equipments on British trucks and buses, four-wheelers and six-wheelers. It obviates all risk of front-brake application exerting a "pull" on the steering control, practically eliminates linkage and cross-shaft bearing friction, and secures automatic equalization between front and rear and between the two front brakes.

Lockheed in England, cooperating with Clayton Dewandre, has introduced a vacuum servo and hydraulic master cylinder as a unit, and several truck makers are using this. Hydraulic operation of the shoes on large chassis is usually effected by operating



Dual air valves and section of combustion chamber in Dennis oil engine



From Commercial Motor, London

Pagefield electro-magnetic brake servo

cylinders exterior to and alongside the brake drums, the piston rod taking effect through the usual camshaft lever.

No British maker is now using a mechanical servo, though one or two have a vacuum device in conjunction with Bendix duo-servo shoes. Pagefield has adopted a magnetic servo. Attached to the casing of one of the propeller shaft universals is a rotating ring with a stationary magnet ring alongside it on the same axis, this magnet ring having an insulated winding. Depression of the brake pedal operates a trigger switch, which passes current from the battery through a winding, thus energizing the stationary magnet ring and bringing it into contact with the rotating ring. The contact causes a 70-lb. rotational pull on the stationary ring; the pull is then conveyed through two steel ribbons to a lever which multiplies the pull by three and passes it on to a brake-distribution shaft. Further depression of the pedal assists the servo in applying the brakes. The degree of servo assistance can be regulated by the driver by means of a rheostat control. The current consumption varies from 0.7 to 1.3 amp. If the servo should fail the mechanical operation of the Bendix duo-servo shoes is unaffected. It is claimed for this scheme that it provides assistance whether the engine be running or not, and operates equally well in both directions.

There is a clear trend away from pressed steel and cast steel and toward nickel and nickel-chrome cast-iron alloys for brake drums. Liner manufacturers and operators have been urging this move on chassis manufacturers for two years or more.

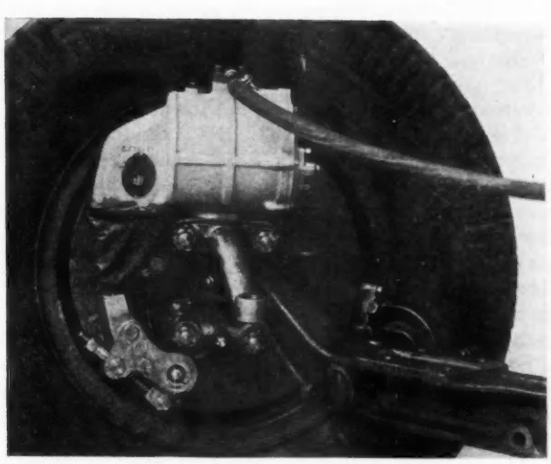
Apart from the introduction of so many new oil engines, there is no new trend at Olympia in engine construction. The majority of new models have overhead-valve engines; Morris on two new types—a 4-tonner and a double-deck bus chassis—uses the side-of-cylinder or high-camshaft arrangement adopted two years ago for a small chassis, and Albion has adopted the same idea in a new model. This arrangement, it may be recalled, comes midway between push-rod operation and an overhead camshaft. The camshaft is located in a trough cast integral with the cylinder block close to the top of the latter; and rockers, longer than those required for an overhead camshaft, actuate the valves directly. The advantage claimed is that the benefits of the overhead camshaft are secured without the drawback of need to disturb the camshaft when the cylinder head must be removed. Morris has designed these high camshaft engines so that all auxiliaries can be fitted at either side, according to whether right-hand or left-hand steering is required, or whether the chassis is to have the normal or forward driving position.

Very few British truck and bus makers have adopted battery ignition; even the new models nearly all have a magneto. The use of inserted cylinder liners has not greatly increased. Albion has dry liners on a new 4-tonner and a bus, and Thornycroft uses them in new overhead-valve engines as well as in the oil engine; but Leyland has discontinued this feature, while Morris and several other makers using integral bores provide sufficient thickness to allow for dry liners to be fitted on overhauling. Albion uses pressed-in exhaust valve seats; A.E.C. now screws these in place instead of pressing them in, but Leyland has discarded renewable seats entirely.

Daimler, who has hitherto used dual sleeve valve engines exclusively for buses, has put forward a push-rod-operated, overhead-valve engine as an option for the benefit of those operators who are not organized for sleeve-valve engine maintenance. The new engine is interchangeable with the sleeve-valve model, though it has a larger piston displacement (103.5 by 130 instead of 97 by 130 mm.). A feature of the design is a camshaft with cams developed on an eccentric base circle to allow greater tolerance in tappet adjustment; valves can be set with 0.060 to 0.075 in. clearance without tappet noise and without appreciable loss of power. The engine develops 90 b.hp. at 2000 r.p.m. with 0.070 in. valve clearances. Daimler is now specializing on chassis for single and double-deck buses. All models have the fluid flywheel and four-speed self-changing gearset now standard on Daimler passenger cars.

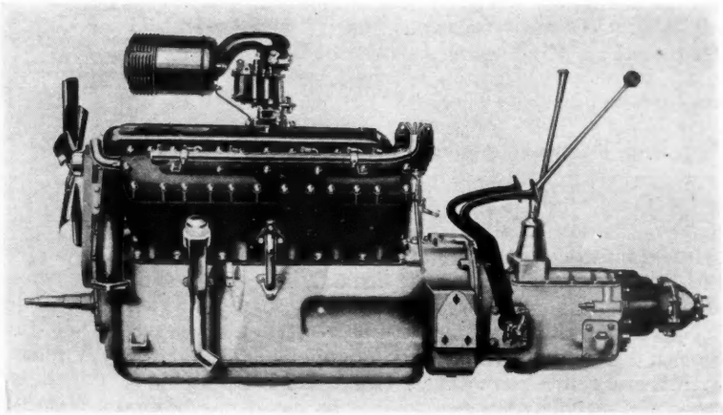
A.E.C., Leyland, Pagefield, Guy, Karrier and Scammell are fitting to heavy-duty six-wheeled trucks (8 to 12-ton loads) an auxiliary gearset giving high and low ratios to all four speeds in the standard gearset. Although eight speeds are thus available the avowed

(Turn to page 898, please)



Auxiliary vacuum servo on front axle swivel as used on the majority of British chassis with triple servo braking + +

Lincoln Uses 65 deg., 150 hp., V-12



The Lincoln 12-cylinder engine (left side view) showing the synchronized silent transmission and free-wheeling unit at the rear + +

DETAILS of the new twelve-cylinder Lincoln became available with the opening of the Automobile Salon in New York, where the new car was exhibited. The wide variety of custom bodies which has been offered by Lincoln in the past will be continued on this twelve-cylinder model, which has a 145-in. wheelbase. New features aside from the engine include a vacuum brake booster, a new free-wheeling unit mounted at the rear of the transmission, thermostatically-operated hood side ventilators, and gear-shift synchronizers for second and high gears.

The angle between the two cylinder banks is 65 deg., which gives slightly unequal spacing of explosions but has the advantage of cutting down the tendency to torsional vibration of the crankshaft assembly. With a bore and stroke of 3¼ by 4½ in. (448 cu. in. of displacement) the engine develops 150 hp. at 3400 r.p.m. Inlet and exhaust valve periods overlap 32 deg., which is rather unusual.

With the standard rear axle reduction ratio the normal engine speed of 3400 r.p.m. corresponds to a car speed of 68 m.p.h. The engine is of compact design and beautifully finished. It has a crankshaft weighing 93 lb. when finished, with seven main bearings of 2½ in. diameter and an aggregate bearing length of 12⅞ in. A torsional vibration damper is carried at the forward end. Compactness has been achieved by careful arrangement of the auxiliaries. The ignition distributor is located at the extreme rear of the engine, which gives better protection against interference with its operation by water. The exhaust pipe is carried forward and underneath the engine, to keep the heat of the exhaust away from the body. A plated metal shield over the water-pump driveshaft and coupling enhances the appearance of the powerplant and at the same time is easily removable when it becomes necessary to adjust the pump gland. An outlet from the oil filler terminates underneath the crankcase and carries away oil fumes.

The generator is driven through a laminated-spring type of flexible coupling. It can be removed without disturbing the camshaft driving chain, as the chain sprocket is carried in an independent bearing, and the coupling spring fits into a recess in the rear end of the sprocket shaft. Automatic adjustment is provided for the camshaft drive chain.

In addition to the thermostatically-controlled radiator shutters there are ventilators in both sides of the hood, those on each side being controlled by a separate thermostat.

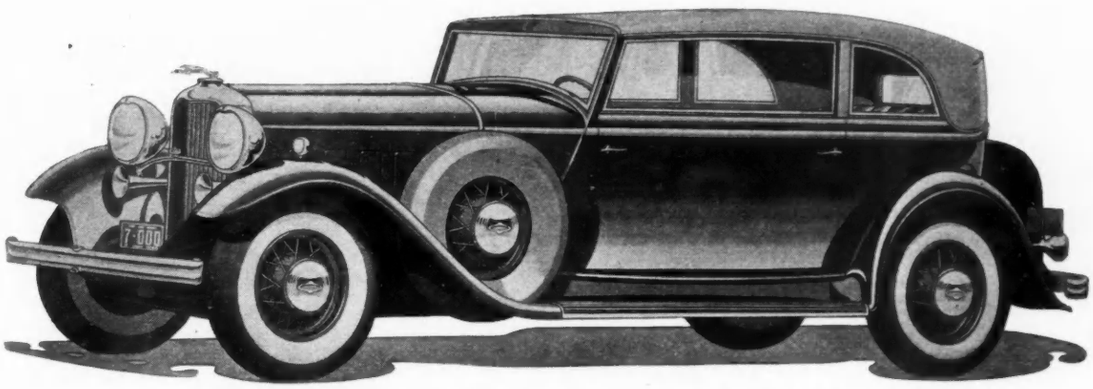
The main cross member of the frame is of the box-girder type; it is stiffened by angle plates and arched upward at the center to clear the propeller shaft. The road wheels, which have drop-center rims and welded steel spokes, have been reduced in diameter from 19 to 18 in., thus permitting of the use of large (7½-in.) tires. Large hubs conceal the wheel bolts. The appearance of lowness has been further enhanced by the use of running boards with their outer edges curved down, so as to bring them closer to the ground. The tread is 60 in. at both front and rear, and the car has a turning radius of 27 ft. in both directions.

Several improvements have been made in the Lincoln transmission. The constant-mesh and intermediate-speed gears are of the helical type, and means for synchronizing the gears when shifting from intermediate to high and vice versa are provided. The free-wheeling unit is located at the rear of the transmission and is therefore effective in all forward speeds. When the reverse is engaged it is automatically locked out. The unit can be cut out

Engine in Variety of Custom Bodies

by the driver by means of a button on the dash immediately in front of him.

Features of the chassis also include a "straight-through" type muffler, woven clutch lining for soft engagement, running boards with rubber coverings vulcanized in place, and four double-acting hydraulic shock absorbers. Double coach-type sills are embodied in the design of all bodies. These are mounted on short out-riggers attached to the frame to give a low body floor height. The instrument panel is engine-turned with the starter-button mounted at the left of the steering wheel.



"Double-Entry" Sport Sedan by Brunn on Lincoln V-12 chassis

Principal Specifications

Number of cylinders, bore and stroke—12—3¼ by 4½ in.
Piston displacement, 448 cu. in.
Horsepower, 150 to 3400 r.p.m.
Valve-port diameter, 1⅞ in.
Valve lift, 11/32 in.
Angle of valve seats, 45 deg.
Valve-stem diameter, ⅜ in.
Compression pressure, 103 lb. per sq. in.
Main bearing dimensions:

Number		Diameter (Inches)	Length (Inches)
1	Front	2½	1⅞
2	Intermediate	2½	1⅜
3	Intermediate	2½	1⅜
4	Center	2½	2
5	Intermediate	2½	1⅜
6	Intermediate	2½	1⅜
7	Rear	2½	3½

Connecting-rod bearings, 2⅛ in. diameter, 2¼ in. length
Number and size of compression rings, three ⅛-in. concentric
Number and size of oil rings, one 5/32 in.
Piston-pin diameter and length, ⅞ in. by 3 in.
C-t-c length of connecting rod, 11⅞ in.
Dimensions of camshaft bearings:

Number	Length (Inches)	Diameter (Inches)
1	3½	1⅜
2	⅞	2⅛
3	⅞	2⅛
4	⅞	2⅛
5	⅞	2⅛
6	⅞	2⅛
7	⅞	2⅛
8	2 9/16	1¼

Valve timing:
Inlet opens — 21 deg.; closes + 47 deg.
Exhausts opens — 57 deg.; closes + 11 deg.
Timing chain, 104 links, 1½ in. width
Carburetor, Stromberg dual downdraft
Starter drive ratio, 11.6 to 1
Shock absorbers, Houdaille double-acting hydraulic

Capacities:

Cooling system	8½	gallons
Crankcase	12	quarts of oil
Transmission	2	quarts gear lubricant
Differential	6½	pints gear lubricant
Fuel tank	28	gallons

Engine to wheel speed ratios: Figures based on standard ratio (12-55)

High	4.58 to 1
Second	8.15 to 1
Low	13.35 to 1
Reverse	15.7 to 1

Rear axle ratios:

13-55	12-55	11-54
(4.23 to 1)	(4.58 to 1)	(4.90 to 1)

Springs:

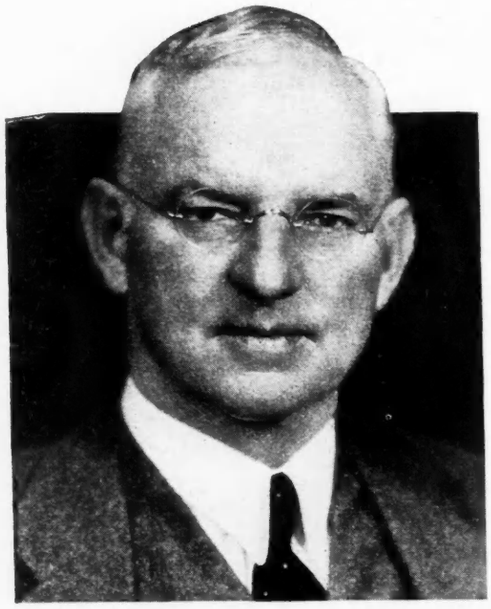
Front	Rear
Length, 42 inches	Length, 62 inches
Width, 2¼ inches	Width, 2½ inches
Number of leaves, 14	Number of leaves, 7
All body types	10, 11 or 12 depending on type of body

Clutch: Double disk type with woven lining for soft engagement.
Steering wheel, steel-core type rim, 19 in. diameter.

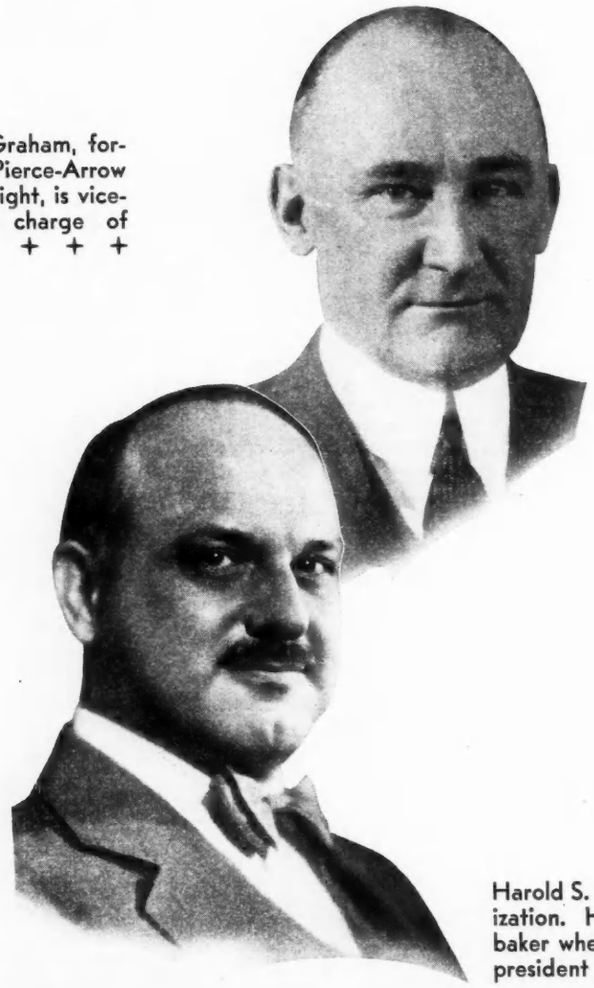
Vance and Graham

Never will so many dealers be assigned to a locality that they cannot all have a reasonable opportunity for making money

Says George M. Graham



The chairman of the board of the new Rockne Motors is A. R. Erskine, president of Studebaker + + +



George M. Graham, formerly with Pierce-Arrow and Willys-Knight, is vice-president in charge of sales + + + + +

DURING the past few months speculation has been rife in the trade as to the character of the automobile just announced as the Rockne and its backing. It can now be officially stated that the new company has the backing of the Studebaker Corp., and that the cars will be manufactured in the former Studebaker plants in Detroit.

A. R. Erskine, Studebaker president, is chairman of the board of the new company. Harold S. Vance, has been elected president, Mr. Vance being vice-president in charge of manufacturing for Studebaker.

George M. Graham, under whose name dealer promotional work has been carried on, is vice-president in charge of sales. Mr. Graham has been associated in similar capacities with Pierce-Arrow and Willys-Overland.

R. A. Vail, formerly production manager of Dodge Brothers, and more recently vice-president in charge of production for Durant, has been elected vice-president in charge of production of Rockne Motors. R. E. Cole, who previous to his positions as chief engineer of Dodge and vice-president in

Harold S. Vance is president of the new organization. He has been recruited from Studebaker where he will continue to serve as vice-president in charge of manufacturing + +

Head New Rockne Motors Organization for Studebaker; Erskine is Chairman

charge of engineering of Durant, was associated with Continental Motors, Liberty Motor Car Co., Saxon Motor Car Company and the Chalmers Company, is chief engineer of the new company.

Frank L. Wiethoff, assistant to Mr. Graham at Willys Overland, is sales manager for Rockne. Its service manager is W. W. Smith. A. G. Rumpf, secretary, is also treasurer of Studebaker. P. O. Peterson, treasurer, recently resigned as director of purchases for the Studebaker Corp. to join the new company. He will also act as purchasing agent.

W. E. Tarr, Rockne comptroller, served Studebaker formerly as manager of budgets and expense control divisons. Knute Rockne, after whom the car is named, had been associated with the Studebaker sales organization in an advisory capacity for several years before his death. Shortly before that time he had been made sales promotion manager, and he was to have been a vice-president of Rockne Motors if he had lived, it having been his intention to give up active football direction after the 1931 season.

Organization of the sales staff and recruiting of dealers for the Rockne six began about four months ago. A series of mailing pieces were sent out over the lists of the Chilton Class Journal Company, publishers of *Automotive Industries*. As a result of the first two mailings some 9000 replies were received, from which a list of likely prospects for Rockne six franchises has been prepared. The campaign also included teaser advertising in the leading automotive dealer publications, including *Automobile Trade Journal*.

The Rockne dealer sales agreement is modeled after the Studebaker franchise. This franchise calls for protection of dealers against price reductions. No deposits will be demanded from the dealers, and dealers orders are required only one month ahead. The selling agreement also provides that Rockne Motors Corp. will buy back cars and parts on an equitable basis when the company terminates a relationship.

"We will not unduly crowd our metropolitan dealers," Mr. Graham added. "Never will so many dealers be assigned to a locality that they cannot all have a reasonable opportunity for making money."

R. E. Cole, who is chief engineer of the organization, was formerly vice-president of Durant in charge of engineering +

R. A. Vail is vice-president in charge of production; was previously in a like position with Durant Motors + + +

P. O. Peterson recently resigned as director of purchases for Studebaker to join the new company +

A. R. Erskine says

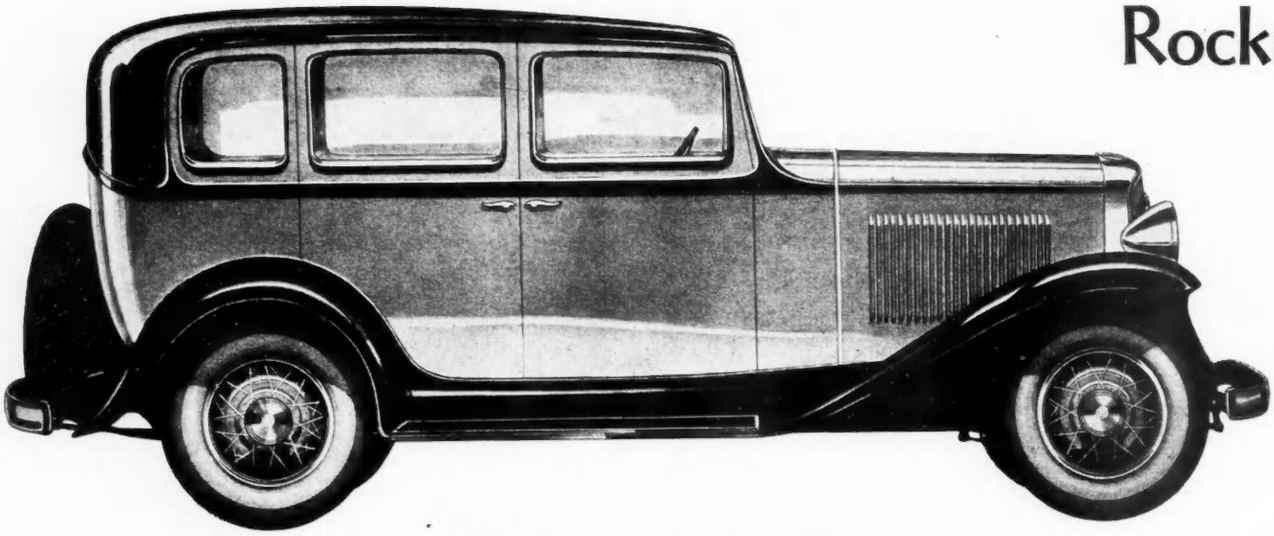
WE are calling this new car the Rockne Six in honor of a man who was our former business associate. Knute Rockne would have been vice-president of Rockne Motors Corp. had he lived. It was his intention to give up active football direction after the 1931 season.

He had been associated with the Studebaker organization for several years and at the time of his tragic passing was a valued executive.

With characteristic energy, he brought to Studebaker the keen mind, magnetic personality and an indomitable persistence.

It seems to me highly fitting that the finest qualities of Knute Rockne, the man, should be so brilliantly reflected and recalled by the stamina, sparkle and speed of the Rockne Six.

Rockne



Rockne five-passenger, four-door sedan

Model 65, with 110-in. wheelbase at prices ranging from $585 up, has five body offerings. On the 75 line, with 114-in. wheelbase priced at $685, there is a choice of four bodies + + +

TWO lines of six-cylinder cars in the low-priced field will be turned out by the newly organized Rockne Motors Corp. of Detroit—the Model 65, with 110-in. wheelbase, which will sell at prices ranging from $585 up; and the Model 75, with 114-in. wheelbase, which will list at from $685 up. A total of nine body types are being offered, and production is scheduled to begin in December.

The Rockne 65 line includes a five-passenger, four-door sedan; a five-passenger, two-door coach; a five-passenger, two-door convertible sedan; a two-passenger convertible roadster, with or without rumble seat, and a two-passenger coupe, also with or without rumble seat.

On the Series 75 there will be a five-passenger, four-door sedan; a five-passenger, two-door convertible sedan; a two-passenger coupe, with or without rumble seat, and a convertible roadster.

Both Rockne lines will be equipped with free-wheeling units effective in all forward speeds, a synchronizing shifting mechanism for high and second in the quiet-second-speed transmissions, free wheeling control on the instrument panel, and switch-key starting by provision of Startix as standard equipment.

Judging from the illustrations available, the general appearance of the cars will be in line with modern trends, the design including sloping windshields of the aerodynamic type, sloping radiators located well forward to accentuate length, outlining of the radiator in chromium and concealing of the rear end by an airfoil apron.

Bodies are roomy, the width being especially liberal, both front and rear treads being larger than standard. Frames are of the double-drop type, incorporating on the 65 an X-type center cross-member, which, together with the virtually all-steel body construction on this model, gives this car a particularly low overall height (68 in.). By locating the gearshift lever well forward on the transmission, and placing the emergency brake lever to the left of the driver, additional leg movement room is provided in the front compartment.

Bodies on the Series 75 are of composite construction. While the wooden sills of these bodies are quite deep, there is no increase in overall height due to this feature, since the body is carried on frame brackets outside the frame side-rails and below the top flange. This type of mounting also has the advantage of reducing body distortion. Doors on both cars are of all-steel construction. Some idea of body dimensions is given in the accompanying table of specifications.

Interior features on both cars include a three-spoke, steel-core steering wheel with adjustable steering column; aviation-type, clockface instruments; generous body insulation against noise, dirt and outside temperatures; adjustable front seats; cowl ventilators, automatic windshield wipers, rear-view mirror; robe rail, foot rests, dome lights and arm rests in the sedans. Hydraulic shock absorbers are standard equipment. The tops on the convertible models are claimed to be easy to raise or lower, and light in weight.

The engines, which have bores differing by $\frac{1}{8}$ in., are fairly conventional in design. Items which the two engines have in common include four-point suspension with a profuse use of rubber, L-head valve arrangement, tin-plated cast-iron pistons for rapid breaking-in

Crashes Low Price Field With Two Lines Starting at $585

and insurance against scoring; Lanchester type torsional vibration damper, counterweighted crankshaft, four babbitt-faced bearings for the camshaft; chain drive for the camshaft; chrome-nickel intake, and silchrome exhaust valves.

Other engine design characteristics may be gained from the accompanying specifications tables. Lubrication is by pressure feed to main, connecting rod and camshaft bearings from a gear-type pump. There is 1¼-in. plain tube-type carburetor, provided with an intake silencer and manifold heat control for seasonal temperature variation.

Electrical equipment, which is of Autolite make (except for the automatic starter control, which is of Bendix manufacture), includes a belt-driven generator, a 102 amp.-hr. battery, and spark control by a vacuum which retards the spark at low throttle openings, as a further insurance against stalling and for smooth idling. As the engine is accelerated the lowered vacuum automatically advances the spark again. This is in addition to the automatic advance in the distributor.

Fuel feed is by a camshaft-driven fuel pump, while a centrifugal pump on the front end of the engine, integral with the fan, a tubular type radiator (flat tube

Rockne Facts and Figures

CAR MODEL	65	75
Wheelbase	110 in.	114 in.
Tire size	5.25/17	5.25/18
Engine make	own	own
No. of cyls.	6	6
Bore and stroke	3⅛ x 4⅛	3¼ x 4⅛
Piston displacement	189.9	205.3
Taxable rating	23.4 hp.	25.4 hp.
Max. hp.	66-3200	70-3200
Max. torque	136-1200	144-1200
No. main bearings	4	4
Pistons, type	cast iron	cast iron
Coasting	tin	tin
Piston rings, total	4	4
Oil rings	1	1
Rings, make	Perfect Circle	Perfect Circle
Piston pin, diameter	13/16	⅞
Length	2 11/16	2⅞
Locked where?	in rod	in rod
Piston bushed?	yes	yes
Bushing, length	⅞	15/16
Conn. rod, length	8¼	10¼
Conn. rod, weight	32.9 oz.	43.68 oz.
Lower end bearing	spun in	spun in
Crankpin, diameter	1 15/16	2⅛
Crankpin, length	1¼	1½
Crankshaft counterweighted?	yes—4	yes—4
Vibration damper?	yes	yes
Main bearing, diameter	2⅛	2⅛
Length, front	1 5/16	2⅞
Length, intermediates	1⅛	1 15/16
Length, rear	1 23/32	2½
Camshaft bearings, no.	4	4
Type	babbitt	babbitt
Camshaft drive	chain	chain
Make	Morse	Whitney
Adjustment	none	none
Valves, intake	chrome-nickel-steel	
Diameter	1 15/32	1⅝
Exhaust	Silchrome	Silchrome
Diameter	1 9/32	1½
Seat angle	45 deg.	45 deg.
Stem diameter	11/32	11/32
Valve lift	5/16	5/16
Timing, intake opens	5° BTDC	.....
Exhaust closes	5° ATDC	.....
Intake closes	40° ABDC	.....
Exhaust opens	40° BBDC	.....
Lubrication	pressure to all main crankpin, etc., bearings; also front end chain	
Pump type	gear	gear
Cooling system, type	pump	pump
Pump location	front	front
Integral with fan?	yes	yes
Water pump drive	belt	belt
Fan belt, width	¾	⅞
Radiator, type	tubular	tubular
Circulation control	thermostat	thermostat
Fan, diameter	16 in.	.....
Fuel capacity	12 gal.	14 gal.
Fuel feed, type	pump	pump
Carburetor, make	.....	Stromberg
Carburetor, size	.....	1¼ in.
Manifold heat control	yes	yes
Intake silencer	.....	A.C.

CAR MODEL	65	75
Exhaust pipe, diameter	.....	1¾
Muffler, make	.....	Sparks-Withington
Ignition, make	Autolite	Autolite
Generator & starter, make	Autolite	Autolite
Generator drive	belt	belt
Battery capacity	.....	102 amp. hr.
Spark plugs	.....	⅞ std.
Starter engagement	Bendix	Bendix
Starter control	Startix	Startix
Flywheel teeth	102	105
Starter ratio	10.2:1	10.5:1
Clutch, make	Borg & Beck	Long
Type	1-plate	1-plate
Facing, outside diameter	8.825	9¼
Facing, inside diameter	6⅛	5½
Facing, type	molded	molded
Facing, thickness	⅛ in.	9/64 in.
Transmission, make	Warner Gear	Warner Gear
No. of speeds	3	3
Second speed	helical	helical
Features	syncromesh and free wheeling in rear	
Ratios, low	2.820	2.820
Second	1.604	1.604
Reverse	3.383	3.383
Universal joints, type	metal	metal
Make	.....	mechanics
Rear axle	½ float.	½ float.
Final ratio	4.4:1	4.73:1
Drive, type	spiral bevel	spiral bevel
Bearings, make	Timken	Timken
Road clearance	8 5/16 in.	8 in.
Splineshaft, diameter	1 3/16	.....
No. of splines	10	.....
Tread	58	58¾
Wheels, type	wire	wire
Rims, size	17 x 3	18 x 3.25
Rims, type	drop-center	drop-center
Springs, type	½ elliptic	½ elliptic
Material	silico-manganese	
Front, length	35½	36
Rear, length	54	54
Width, front and rear	1¾	1¾
Shackles, make	Tryon	Tryon
Shock absorbers, make	Houde	Houde
Steering gear, make	.....	Ross
Ratio	13-1	15-1
Steering wheel, diameter	17 in.	17 in.
Turning radius	33 ft.	.....
Front axle end	Reverse Elliott	
Ground clearance	7⅞	.....
Tread	56	57½
Brakes, type, service	4-wheel	4-wheel
Make	Bendix	Bendix
Lining, make	Hycoe	Hycoe
Lining, width	1½	1½
Drum diameter	11 in.	12 in.
Braking area, sq. in.	143	148
Hand brake operates	service	service
Frame, length	154⅝	159⅞
Side rails, depth max.	5½	5 15/32
Flange, width	1¾	2
Stock, thickness	9/64 in.	9/64 in.
Cross-members	X-member	conventional

on the 75), and a thermostatic control for water circulation comprise the cooling system. Hydrostatic gasoline gages and engine temperature indicators are standard equipment on both instrument panels.

Different clutches are used on the two cars, the 65 carrying a 9-in. Borg & Beck, while a Long single-plate 9¼-in. clutch is used on the larger model. Transmissions appear to be identical on both cars with the aforementioned features of synchromesh, free wheeling and silent second. They are products of the Warner Gear Co.

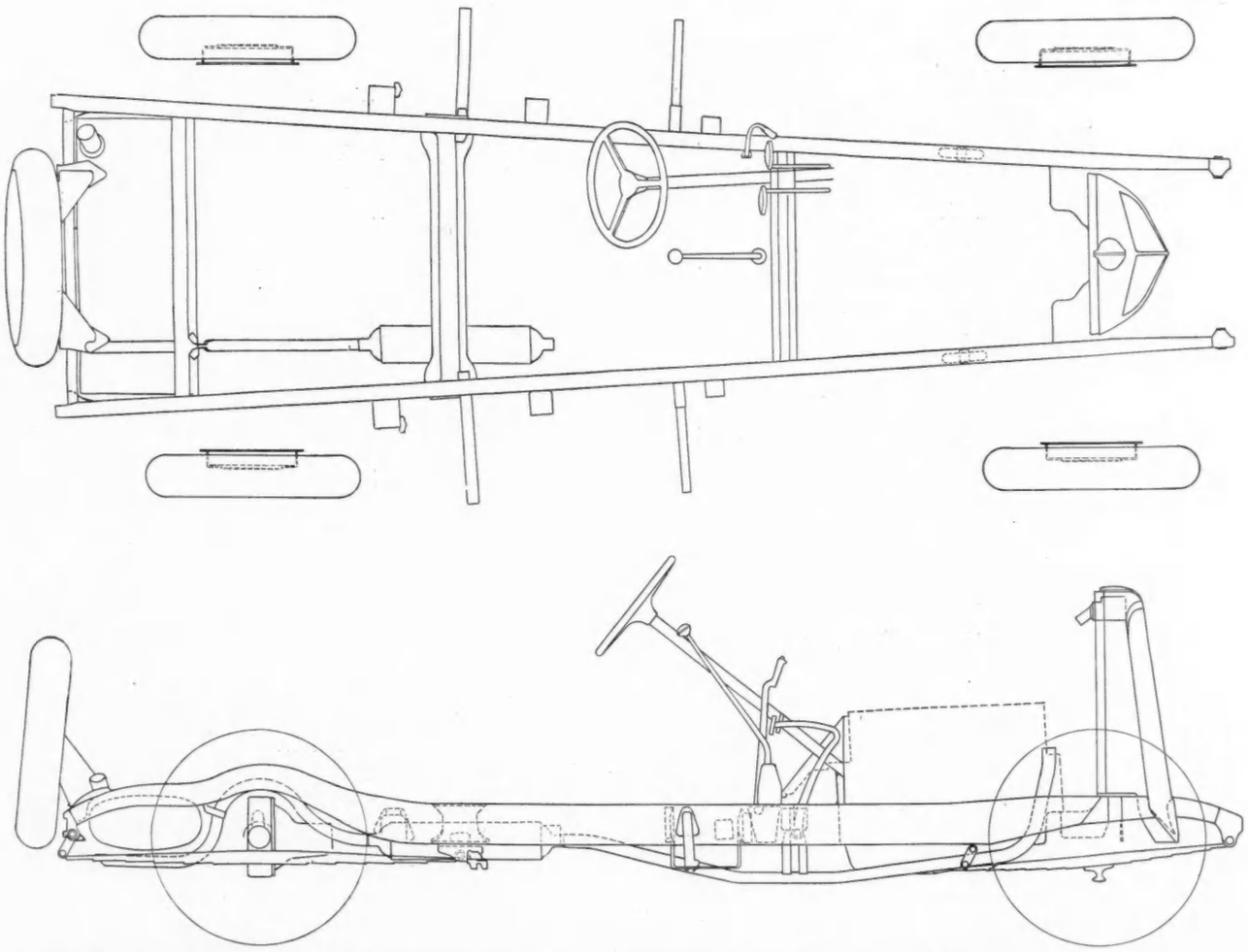
The free-wheeling unit is of the latest type, mounted in back of the transmission to provide free wheeling in all forward speeds. When the reverse is engaged the unit is locked out automatically, and return of the shift lever to a forward speed position returns the over-running clutch to the free-wheeling position. The free-wheeling lock-out control, moreover, is interconnected with the clutch pedal in such a manner that it cannot be engaged or disengaged without throwing out the clutch, Rockne engineers believing this to be desirable as a safety measure in the case of drivers unaccustomed to free wheeling, as are almost all owners in the field to which the Rockne cars will appeal. The free-wheeling lock-out control itself is in the form of a lever on the dash next to the panel. Pedal controls are attached to the frame rather than the powerplant to prevent the transmission of vibration to the body.

Rear axles on both cars are semi-floating, with spiral bevel gear final drive. The 65 axle has heavy malleable castings with tubular ends inclosing the axle shafts, while a banjo-type axle housing of pressed steel is found on the 75. Both axles have Timken bearings throughout.

Front axles are of the tubular type, with reverse Elliott ends. Springs are semi-elliptic all around, and of silicon-manganese steel, with self-adjusting shackles. Front springs are shackled at the rear. Brakes are four-wheel internal, the brake lever operating the same set of brakes as the pedal. Steering gears are cam-and-lever, with 13 to 1 reduction on the 65 and 15 to 1 on the 75. Steering wheels are 17 in. in diameter. Five wire wheels are standard equipment on the standard models, with six wire wheels and fender wells on the de luxe editions.

Tires are 5.25 and 5.50 sections on 18-in. rims for the two cars respectively. Twin beam headlamps and a rear traffic signal are included in the lighting system.

Rockne officials state that both the 65 and 75 are easily capable of 70 m.p.h.



Plan and elevation of Rockne 75 chassis. Note straight tapered frame and location of main portion of exahust pipe where it is exposed to air stream

Courtesy of W. W. Nichols

Here is an excellent view of a prominent European forge shop. Husky overhead traveling cranes do the heavy lifting. This was taken recently in the works of A. Bausig, A.G., Berlin, Germany

PRODUCTION LINES

Healthy Wood

Within a few hours after green lumber is sawn from the log it is attacked by stain-producing fungi. As a result, the fine, bright lumber intended for machined wood products is badly discolored before using. The most common form of sap-stain is blue-stain. Although blue-stain is not a form of decay, the conditions conducive to the growth of these fungi are also favorable to decay-producing organisms. Recent experiments by the U. S. Department of Agriculture have proved the efficacy of a chemical initially designated as du-Pont disinfectant No. 745. Under the name Lignasan, this product is now offered to industry as a lumber disinfectant. It is applied as a cold solution—dipped or sprayed.

Milling Pointers

Frank Curtis of Kearney & Trecker points out some important things to consider in selecting milling cutters. He says, "The size of the driven gear on the spindle of *any* milling machine determines the largest cutter that should be used. To be on the safe side, the cutter should never be much larger than this gear, and preferably smaller if the proper cutting speed can be obtained. The depth of cut naturally is important, because it alters conditions."

On this basis the cutter diameters below are recommended for the new high-speed Milwaukee mills.

Page Progress

Keeping up with what's new in case hardening? Get a copy of "Heat Treatment of Steels with Cyanides and Salts," sixth edition. Issued as part of their service to production men by the Roessler & Hasslacher Chemical Co. It contains the latest material on the use of molten cyanide baths for the lower temperature nitriding of special alloy steels. Also data on Cyanide Baths, "case" composition, Cyanide Reheat, Mottling, Localized Hardening, the efficient use of Heat Treating Salts, etc.

Fabric Values

An apparatus for testing heavy and light fabrics has been perfected by Schopper of Germany. According to A.S.A. Bulletin No. 66, this tester subjects the sample to a combined rotary and rolling motion. Standard testing speed is 70-80 r.p.m. Duration of test set arbitrarily at 5000 or 10,000 revolutions. The sample is weighed before and after within a tolerance of 0.01 gm.

Short Centers

Just once in a while we see a handbook as good as the latest one by the E. F. Houghton Research Staff. It's called "Vim Short-Center Drives." It contains charts, tables, and engineering data on drives ranging from 5 to 100 hp. Copies will be delivered on request by a Houghton representative.

Coming Along

From the U. S. Bureau of Mines comes word that at least one industry showed a positive growth in 1930. That's the manufacture of cemented tungsten-carbide tools. Applications for these tools continue to grow by leaps and bounds.

Steel Chips

Widia "X" for turning steel was announced recently by Thomas Prosser & Son. Feeling that production figures would be of interest, a few test cases are given below.

"On a chrome nickel steel corresponding to S.A.E. 3335, Widia 'X' was run at a speed of 197 ft. per minute, a feed of 0.060 in. and depth of cut of 0.40 in. After 5 minutes' use it was removed from the lathe. When examined under a microscope, no wear or cratering were discernible. A Widia cemented tungsten-carbide tool under the same speed, feed and cut showed appreciable cratering after 1¾ minutes' use. The color of the chip made by the new tool indicated that much less heat was generated."—J. G.

Cutter Diameters Recommended for Millwaukee Mills

Speed Range R.P.M.	STEEL Depth of Cut Over ⅛ in.	STEEL Depth of Cut Under ⅛ in.	CAST IRON Depth of Cut Over ⅛ in.	CAST IRON Depth of Cut Under ⅛ in.	ALUMINUM Depth of Cut Over ⅛ in.	ALUMINUM Depth of Cut Under ⅛ in.
15- 150	7 in.	9 in.	8 in.	10 in.	10 in.	12 in.
30- 300	6 in.	8 in.	7 in.	9 in.	9 in.	11 in.
50- 500	5 in.	7 in.	6 in.	8 in.	8 in.	10 in.
100-1,000	3 in.	5 in.	4 in.	6 in.	6 in.	8 in.

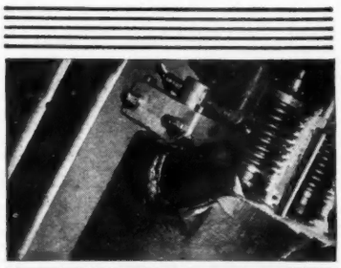
MANUFACTURING MANAGEMENT METALLURGY

Automotive Oddities—By Pete Keenan

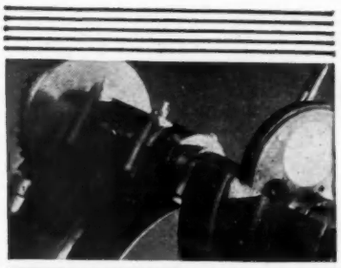
NAPOLEON ONCE CONSIDERED INVADING ENGLAND BY AIR
A PHOTO ELECTRIC CELL COUNTS THE AUTOMOBILES THAT PASS THROUGH THE HOLLAND TUNNEL, N.Y.
Pete Keenan
NED BLACKBURN OF PITTSBURGH, TOLD THE JUDGE, THAT THE REASON HE RAN THRU A RED LIGHT WAS BECAUSE HE DIDN'T KNOW HOW TO STOP A CAR.
SINGAPORE TRAFFIC COPS HAVE WINGS THAT SERVE AS STOP AND GO SIGNS
Malay States.
DISCOVERY OF NON-SHATTERABLE GLASS.
Back in 1903 the chemist Edouard Benedictus dropped an empty flask. Much to his surprise it did not shatter. The coating of its evaporated contents held the glass together.

Do You Know An "Oddity"?

Correspondence about "Automotive Oddities" is invited. Contributions used will receive editorial mention when practicable. If you are interested in the source of, or the reason for, a particular "Oddity," ask the editorial department of Automotive Industries about it.



NEWS OF THE INDUSTRY



Salon Finds Buyers With Important Cash

Sales Pass Half Million Dollars

NEW YORK, Dec. 2—The opening guns of the 1932 automobile sales campaign as fired this week at the Automobile Salon have scored heavily, particularly among those ranks of buyers who can afford high-priced individual transportation. While attendance and sales have not reached figures attained two or three years ago, they have been highly satisfactory and the result has been a marked increase in enthusiasm and morale of the exhibitors and their salesmen. During the first three days of the Salon, retail sales passed the half-million dollar mark at this exhibit and it has still three days to run at the time this preliminary report is being prepared.

Seiberling Profits

AKRON, Dec. 1—The Seiberling Rubber Co. of Akron reported net profits for the fiscal year ending Oct. 31, 1931, of $850,090 before depreciations, of $500,348 after all depreciation charges were marked off. This profit compared with a $1,282,098 loss for the company in 1930, F. A. Seiberling, president, announced.

Mr. Seiberling attributes a large part of the improvement in the business of his company to a new "triple-tread" tire, having transverse holes that renew the tread as the tire wears down.

Chevrolet Prices Stay

DETROIT, Dec. 3 — Prices on the new line of Chevrolet cars announced this week in *Automotive Industries*, will remain the same as prices for comparable types in the succeeding line, according to an announcement made today by the Chevrolet Motor Co.

AUTOMOBILES, the 1932 market, the dealers, the competitive situation, are "glorified" in the December issue of *Fortune*. Winold Reiss portrays in color: Nash, McAneeny, Grant, Cord, Macauley, and Bendix. Our old friend W. Rittase enlivens the text with some excellent photographs. The story is *Fortuna*tely anonymous, but seems quite competent, even though no credit is given for the mass of information collected undoubtedly from other sources. Have you a plate-glass top on your desk? Several of the illustrations in the article would make colorful material to place under it.

"Say, Sarge, my beat is all cluttered up with cars which stalled after they bought gasoline at a station down here," a worried constable telephoned headquarters in Hamilton, Ont., one Saturday night. He sought advice. Scores of motorists had taken advantage of an extra cheap sale offer and had the tanks of their cars filled. Each got a half-block from the station when the engines refused to run. They appealed to the constable, but his rule book made no provision for the situation. Detectives were unable to penetrate the mystery, so they advised the motorists to take their problems to a legal expert.

THE NEWS TRAILER

Exit November!

Production Bumps Bottom

NEW YORK, Dec. 2—Not since the Department of Commerce began the publication of motor vehicle production figures in July, 1921, has production reached the low point of 65,562 units, which is the figure reported today for November at the regular monthly meeting of the directors of the National Automobile Chamber of Commerce. This represents a drop of 20 per cent under the October figure of 81,582 and compares with a drop of 11 per cent in November of last year. It is also 54 per cent under production of November last year when the figure was 142,161.

Production for the first eleven months of the year thus becomes 2,343,834 units, as compared with 3,348,855 for the corresponding period last year, or a drop of 30 per cent. The apparent excessive drop in November was not looked upon by the directors as serious in view of the fact that a number of the manufacturers have post-

(*Continued on page 891*)

G.M. Keeps Its Share of Market

Pamphlet Report Cites Strong Position

NEW YORK, Dec. 4—Alfred P. Sloan, Jr., president of General Motors Corp., in a statement accompanying the financial report for the third quarter mailed to stockholders today, points out that the corporation will show this year as large a percentage of the total automotive business as has yet been enjoyed. Pointing to the fact that gasoline consumption during 1931 will probably attain the largest volume in history, he concludes that resumed purchasing of new motor cars can only be a question of time.

The current period has resulted in the elimination of the inefficiency, waste and false thinking which invariably accompany periods of intense and prolonged prosperity and inflation, as a result of which the industry will be in a strategic position to take advantage of the return of normal buying when it comes about.

Danish Tariff Up

WASHINGTON, Dec. 3—Effective Nov. 28, Danish import duties on passenger automobiles with wheelbase over 112 in., and chassis, as well as all passenger bodies, were increased .25 crown per kilo (2.2 lb.) plus 25 per cent ad valorem, according to a cablegram from Commercial Attache Charles B. Spofford, Jr., Copenhagen. The ad valorem duty which has been increased was formerly 5 per cent. The specific duty remains unchanged. The present rate of the Danish crown is between 19 and 20 cents.

The same measure increased import duties on tire casings and cushion tires to .80 crown per kilo (formerly .40 crown per kilo plus 6 per cent), and on solid tires, to .40 crown per kilo (formerly .12 crown per kilo, plus 6 per cent).

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Dec. 2—The continued caution of retailers, who are buying only in small lots, retarded wholesale and jobbing trade last week. The stormy weather stimulated the sales of clothing, but the retail movement of holiday goods was slow. There was a slight improvement in collections in scattered sections, but on the whole they were slow. The Guaranty Trust Co.'s index of business activity for October was 60.9, as against 62.4 for the preceding month, and 78.0 a year ago.

LIFE INSURANCE SALES

Sales of ordinary life insurance during October continued to trend toward improvement noticed in the preceding two months. October sales were 12 per cent below those a year ago, while total sales during the first 10 months of this year were 15 per cent below those in the corresponding period last year.

ELECTRICITY PRODUCTION

Production of electricity in the United States during the week ended Nov. 21 was 3.9 per cent below that a year ago. Production in New England alone, however, increased 1.5 per cent.

EMPLOYMENT INDEX

The index of employment in 15 major industrial groups for October, according to the Bureau of Labor Statistics, stood at 67.3, as against 69.6 for the preceding month, and 78.6 a year ago. The index of payroll totals was 53.7, as against 55.4 for September and 72.7 a year ago.

CAR LOADINGS

Railway freight loadings during the week ended Nov. 14 totaled 690,366 cars, which marks a decrease of 26,663 cars below those during the preceding week, a decrease of 138,657 cars below those a year ago, and a decrease of 292,560 cars below those two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Nov. 28 stood at 67.8, as against 68.6 for both the week and two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended Nov. 25 were 24 per cent below those a year ago.

STOCK MARKET

The trend of the stock market last week continued downward. The railroad issues were particularly under pressure, for the failure of the railway unions to accept the railroads' proposed wage cuts was considered an adverse development. Another depressing factor was the drop in sterling exchange of more than 6 cents to the pound sterling. Most issues suffered sharp net losses for the week.

BROKERS' LOANS

Brokers' loans in New York City during the week ended Nov. 25 declined further, bringing the total down to $751,000,000, as against $775,000,000 on Nov. 18.

RESERVE STATEMENT

The trend toward the reduction of the high level of Federal Reserve credit outstanding in recent weeks was continued during the week ended Nov. 25. Holdings of discounted bills increased $24,000,000, and holdings of government securities remained unchanged, but holdings of bills bought in the open market decreased $55,000,000. The reserve ratio on Nov. 25 stood at 65 per cent, as against 64.1 per cent a week earlier, and 62.5 per cent two weeks earlier.

Citroen Broadcasts

Andre Citroen, French motor manufacturer, was the speaker last Sunday evening (Nov. 29) in the first of a series of direct transoceanic broadcasts to Philadelphia, arranged by the Chamber of Commerce of that city, in connection with its campaign for the development of its port.

M. Citroen discussed his recent visit to this country and spoke of the opportunities for Philadelphia and its port in import and export trade.

Soviet Union Notes

(From the *Economic Review of The Soviet Union*)

U. S. S. R. has started work on a plant to produce carburetors at Samara. This plant will supply the entire automobile, tractor and airplane industries of the Soviet Union with carburetors, all of which at present are imported. The plant is expected to be in operation by March of next year and to be in full production by June.

* * *

The Amo automobile plant at Moscow, U. S. S. R., which was completed on Oct. 1, produced 75 trucks and 1 bus during the first month of production. By Nov. 15 it was producing 12 machines daily and it is expected to be up to 50 a day by the end of the year.

* * *

The Yaroslavl automobile plant of U. S. S. R. produced its first eight-ton truck on Nov. 7. This plant is expected to produce 27,000 five-ton trucks during 1932.

Loomis Talks to Club

NEW YORK, Dec. 1—Edward F. Loomis, secretary of the Motor Truck Division of National Automobile Chamber of Commerce, was the principal speaker last evening at the Manufacturers Association Traffic Club of Lancaster, Pa.

Mr. Loomis told the members of the club that proposals to place motor trucks and buses under additional regulation and taxation will only result in restricting the advantages of highway carriers as essential instruments in the nation's production and distribution of machinery. He pointed out that recent trends in legislation were designed to an alarming degree for no other purpose than to deny shippers and consumers the economy of highway carriers.

Mack Trucks Declares

NEW YORK, Dec. 1—Mack Trucks, Inc., has declared quarterly dividend of 25 cents, payable Dec. 31 to stockholders of record Dec. 15.

Steel Prices Sag On Heavy Orders

Automotive Buying Comes Out in Year's End Market

NEW YORK, Dec. 3—Automotive buying of steel, which usually goes into eclipse during the first December week in anticipation of inventory and show periods, was the outstanding feature of this week's steel market activities. Releases were sufficient to enable some of the finishing mills to step up operations to the best rate in months, while the others were able to maintain last week's mildly improved schedules. Prices of a number of products moved impressively lower, indicating that now that business is beginning to come out in somewhat more worth-while tonnages the competitive struggle among producers has grown acute. The market for steel bars and other heavy rolled products gave way to the extent of $2 a ton, 1.50@1.60 cents, Pittsburgh, and 1.60 @1.70 cents, Chicago, being chalked up. The market for cold-finished bars is easier as the result of the dip in the hot-rolled product. The sheet market is none too strong, enameling stock having been marked down. Specialists in full-finished automobile sheets enjoy a somewhat better run of orders than do rollers of ordinary sheets. The strip-steel situation is rather contradictory. Some mills are known to have made concessions to automotive buyers, while others speak hopefully of the outlook for a $1@$2-per-ton advance in the near future. Automotive business in bolts and nuts has been placed at better discounts than heretofore obtainable. Automotive alloy steels show more activity. Wire products are also coming in for more interest on the part of automotive consumers than in some time.

Pig Iron—Quite a little additional business for December shipment has been placed by Middle West automotive foundries. Interest in 1932 deliveries is gradually quickening. Reports are current of a shipment of Dutch iron being afloat with New York as its destination. Whether this presages such pressure on domestic prices as was exerted by imports preceding the advance in duty remains to be seen.

Aluminum—While Canadian shipments in October, as revealed by Dominion export statistics just come to hand, were the heaviest on record, totaling nearly 10,000,000 lb., and almost as large as the exports for the entire preceding nine months, none of this metal came to the United States. Two-thirds of it went to England in anticipation of a duty being placed on aluminum by the coalition government, and the remainder to Japan.

Copper—With announcement that the Belgian owners of the Katanga mines in South Africa have fallen in line, and that as a result curtailment of output will proceed along worldwide lines, the market has turned firm. Some metal was offered at 6¾ cents, delivered Connecticut, at the beginning of the week, but it looked then as though 7 cents would be asked by producers before long.

Tin—The sharp decline in the value of the pound sterling caused Straits tin to be offered at 21.40 cents at the opening of the market this week.

Lead—Storage battery manufacturers have bought freely.

Urges Proper Transport Study

Fenner of Mack Says Each Medium Has Own Place

NEW YORK, Dec. 1—D. C. Fenner, chairman of the Motor Vehicle Conference Committee and vice-president of Mack Trucks, Inc., speaking before the New Britain Traffic Association, New Britain, Conn., last evening, urged the application of each transport facility to that phase of distribution where it functions with maximum efficiency. To this end he decried the tendency to enact legislation which discriminates against the public by increasing distribution costs. Mr. Fenner's subject was "The Manufacture of Transportation."

"Because we have a surplus of certain types of facilities and an insufficient amount of other types, we lose several billion dollars annually in wasteful distribution," said Mr. Fenner.

"We must eliminate duplication of effort, cut down the expense of idle equipment, reorganize routing and reduce the time lost by transfer if we are to have a transportation program which will afford superlative efficiency of service at the lowest possible cost."

Mr. Fenner urged the expedition of efforts which will hasten the development of a distribution system that can meet the hearty approval of shippers. Refuting railroad statements that commercial vehicle transportation is subsidized by the government, Mr. Fenner pointed out that our 700,000 miles of surfaced highways would not have been built had there never been any trucks or buses. The fact remains, however, that commercial vehicles in 1930 paid 27 per cent of the total of the motor vehicle tax bill, although representing only 13 per cent of all motor vehicle registration.

Cord Cites Lack of Traffic Study

NEW YORK, Dec. 1—Lack of cooperation in the various departments of government in the closing off of streets for repair without regard to compensating provision for traffic flow is criticized by E. L. Cord, president of the Auburn Automobile Co., and chairman of the Street Traffic Committee of the National Automobile Chamber of Commerce.

Less than a score of the 195 cities with a population of more than 50,000 have a centralized traffic engineering department with a traffic engineer in charge, he points out.

This lack of cooperation results in improper distribution of the traffic flow, with corresponding confusion and loss of trade to various interests.

Motor Securities Decline

NEW YORK, Dec. 1—Motor securities declined on the stock market 5.1 per cent during November, according to Frazier Jelke & Co., contributing to a general decline throughout the list of 11.1 per cent. At the beginning of the month the seven motor securities used by this company in their tabulation had a stock market valuation of $1,370,412,000, and at the end of the month the valuation had declined to $1,300,632,000.

Of the thirteen groups used by Frazier Jelke in this tabulation only the foods showed a smaller decline than motors, their decline being 1.3 per cent. The heaviest drop of the month was in the rail group, which declined 22.6 per cent.

Shows Will Bring Flood of Gadgets

NEW YORK, Dec. 1—A number of new accessories designed to increase the owner's pleasure in his car and the life and utility of that car will be shown in the accessory section of the national automobile shows. Among these new devices are such things as a condenser for attachment to the top of the radiator to prevent the loss of anti-freeze solutions and of the radiator cooling water itself.

There will also be a new hydrometer type of instrument calibrated to test any or all of a number of different standard anti-freeze solutions.

Cigar lighters which automatically take the first few puffs so that a cigar or cigarette is delivered ready for smoking will also be shown. Another accessory for the comfort of the smoker is a combination attached to the steering emblem, consisting of a clock, memo pad, pencil and holder for a standard package of 20 cigarettes.

New heaters will also be shown, one of these being an electrically operated water heater with drafts of air directed through it by a small electric fan, which is portable and can be placed anywhere in the car.

There will also be a crankcase ventilator oil economizer attached to the breather pipe of the engine to ventilate the crankcase and at the same time recapture any oil that may be thrown out, retaining it for a sufficient period of time to allow any gasoline that may have seeped in to evaporate before returning it to the crankcase.

Other accessories include frost shields, improved tail light reflectors, lamp bulbs with reflectors incorporated within them, overhead valve silencers, and improved grease guns which make several kinds of lubricants instantly available for their special uses.

Buick Produces 9053

DETROIT, Dec. 1—Buick Motor Co. has reported total production of 9053 passenger cars during November, compared with 5012 during October, and 7177 in November, 1930.

Per-Car Profits On Chevrolet Up

Dealers Making More Money in 1931, Says H. J. Klingler

DETROIT, Nov. 30—In connection with the announcement of the new Chevrolet, H. J. Klingler, vice-president in charge of sales, Chevrolet Motor Co., discussed the dealer situation with a representative of *Automotive Industries*. Dealer profits per car in 1931 in the Chevrolet organization, Mr. Klingler stated, are approximately two and one-half times the per car profit in 1930.

Approximately 63 per cent of Chevrolet dealers have made a net profit during 1931, with approximately 20 per cent breaking even. Mr. Klingler pointed out that business of the Chevrolet Motor Co. was off only 5 per cent for 1931, as compared with 1930.

On Dec. 5, the announcement date of the new car, approximately 10 to 12 thousand cars will be in the hands of dealers for display purposes. The December schedule has been restricted to approximately 37,000 cars in order to insure quality of production, especially in view of the adoption of synchromesh and free wheeling.

As of Dec. 5, there are approximately 25,000 cars of the 1931 series in dealers' hands. Chevrolet dealers are protected on these.

S.A.E. Lands Willys For Dinner Program

John N. Willys will be the speaker at the annual dinner of the Society of Automotive Engineers, to be held in the ballroom of the Pennsylvania Hotel, New York City, Jan. 14, 1932, according to a statement issued from the S.A.E. headquarters in New York City by John A. C. Warner, general manager.

Mr. Willys will be introduced at the dinner by William P. MacCracken of Washington, formerly Assistant Secretary of Commerce for Aeronautics. The only other speaker scheduled for this banquet will be "Senator" Ford, humorist.

Arrangements for the banquet are in charge of a committee consisting of Adolph Gelpke of the Autocar Co., Philadelphia; F. K. Glynn of the American Telephone & Telegraph Co., New York City, and Norman G. Shidle of Chilton Class Journal Co., Philadelphia.

Young Returns to Office

Dubois Young, president and general manager, Hupp Motor Car Corp., has returned to his office following his recovery from a recent operation.

Men of the Industry and What They Are Doing

Frank Off to Europe; S.P.A. Adds to Staff

Arvid L. Frank, vice-president and general manager of the Studebaker Pierce-Arrow Export Corp., will attend the annual international automobile show in Brussels December 9-20. He sailed from New York on the S.S. Olympic Nov. 28.

The Brussels Salon will be the scene of the world's premiere showing of new Studebaker and Pierce-Arrow motor cars for 1932. A banquet and private showing of new models, at which Mr. Frank will preside, will be held for Studebaker and Pierce-Arrow dealers on Dec. 8.

Holton Returns to Factory

A. P. Holton, recently made district manager for the corporation in the West Indies territory, arrived Nov. 23 at the South Bend factory to confer with officials.

Petersen Made Representative

Fritz Petersen has been made district representative for the corporation in Germany.

Rieth Made Manager

Leslie A. Rieth has been appointed district manager for South America. His territory includes Argentina, Uruguay, Paraguay and Brazil.

Hardie Joins Staff

E. E. Hardie has joined the European staff of the corporation as district manager for central Europe, according to R. A. Hutchinson, regional director of European territories. Mr. Hardie will represent the company in Albania, Austria, Bulgaria, Czechoslovakia, Greece, Hungary, Jugoslavia and Rumania.

Bos Made Manager

Henry Bos has been appointed district manager for India. Mr. Bos will operate under the direction of D. W. Smith, regional director, in charge of Studebaker and Pierce-Arrow business in the Orient.

Dirksen Made Manager

Eugene Dirksen recently joined the European organization of the Studebaker Pierce-Arrow Export Corp. as district manager in Belgium, Luxembourg and Switzerland.

Dodge Executives Scatter Over U.S.

Employing the policy established last year of not calling dealers into the factory for a conference in preparation for the start of a new year, two groups of Dodge Brothers executives left last week in opposite directions for a three-week trip extending from coast to coast, and from Canada to the Gulf. Sixteen regional meetings will be held in important key cities by the executives composing the group covering the eastern part of the country, and 12 meetings by the group traveling West.

The personnel of the party scheduled for meetings in the East, and which is headed by A. vanDerZee, general sales manager, includes W. S. Graves, truck sales manager; J. W. Hutchins, director of Plymouth sales for Dodge Brothers; F. N. Sim, director of advertising; W. R. Bamford, assistant to director of service; J. B. French of the E. G. Budd Mfg. Co., and R. W. Wolfers of Advertisers, Inc.

W. M. Purves, assistant general sales manager, heads the group scheduled for meetings in the West. The other executives are K. A. Ridenour, director of sales promotion; L. J. Ouellette, assistant director of advertising; Allison Miller, assistant to truck sales manager; D. T. Stanton, director of service; H. H. DuBois of the Budd Body Co., and A. M. Corrigan of Advertisers, Inc.

Tire Prices Reduced

AKRON, Dec. 2—Reductions in tire casing prices ranging from 5 to 10 per cent were put into effect Dec. 1 by the three larger rubber companies and many of the smaller manufacturers of the Akron area.

Announcements of the price cuts by officials of Goodyear, Goodrich and Firestone companies each stated the reductions had been made "to meet competition and to stimulate tire business during the slack period of tire purchases."

The 5 to 10 per cent reduction applies to the better grade tires for passenger cars. No changes have been announced for truck tires or the second-grade tires. A 15 per cent slash in the price of inner tubes was put into effect along with the tire price changes.

Reo Launches 790

DETROIT, Dec. 1—Reo Motor Car Co. has reported November production of 790 passenger cars and speedwagons, against 1052 for October and 1181 in November, 1930.

Hupp Output 258

DETROIT, Dec. 1—Hupp Motor Car Corp. has reported production during November totaling 258 passenger cars, compared with 507 in October.

Advocates Higher Vehicle Prices

Benjamin Schwartz, Scrap Institute Head, Cites Their Benefit

NEW YORK, Nov. 30 — Low prices of automobiles are forcing the manufacturers to exert such pressure on steel producers and other suppliers of raw material that neither steel industry wages nor profits can be maintained, Benjamin Schwartz, director general of the Institute of Scrap Iron & Steel, Inc., told the Rhode Island Purchasing Agents Association at a meeting at the Naragansett Hotel, Providence, R. I., last week.

An increase of $25 per car would help certain branches of the steel industry to manufacture at a profit, Mr. Schwartz said, and at the same time create a fund to scrap 3,000,000 old cars, enhancing the replacement market for new cars.

Attacking the price cutting and the fetish of the need for a new industry to bring back prosperity, Mr. Schwartz declared that what is needed today is a higher degree of statesmanship in industry to restore confidence in business as it stands.

Depression Smiles On All Cord Corp. Units

CHICAGO, Nov. 30—Every division of the Cord Corp. has experienced its most successful year in 1931, L. B. Manning, executive vice-president, announced today. The fiscal year for the companies ends Nov. 30.

Auburn car sales will be more than 150 per cent greater in actual units for the present fiscal year than for the same period last year, Mr. Manning said, with a gross volume of business totaling upwards of $34,000,000, exclusive of its subsidiaries. He pointed out that the Lycoming Mfg. Co. has shown a very substantial gain, both in dollar volume and units, and that Duesenberg, Inc., another of the Cord Corp. divisions, has sold more than 85 per cent of all the cars built in America for $8,500 and over. In the aircraft field, he said, the Stinson Aircraft Corp. built and sold 78 per cent of all the cabin airplanes in the country this year, as well as more tri-motor planes than all the other companies combined.

Evans Reports Loss

DETROIT, Dec. 1—Evans Products Co., Detroit, and subsidiaries, has reported net loss of $6,965 after depreciation, federal taxes, etc., for nine months ended Sept. 30, against net profit of $98,344 during the same period of 1930.

Output Estimate Bumps the Bottom

November Production Seen as 20 Per Cent Under October by N.A.C.C.

(Continued from page 887)

poned their announcements of new models and it is expected that December will show a marked upturn.

The directors discussed the agitation which has been progressing for several months toward Federal taxation on the sales and use of motor vehicles, and reaffirmed their opposition to any legistlation discriminating against the motorist.

S. A. Miles, manager of the National Shows, discussed plans for the shows to be held in New York, Jan. 9 to 16, and in Chicago, Jan. 30 to Feb. 6. John N. Willys, U. S. Ambassador to Poland and former president of the Willys-Overland Co., who was present as a guest, discussed the outlook for Europe with particular reference to foreign trade possibilities in the immediate future.

Alvan Macauley presided, and other directors present were: A. J. Brosseau, E. L. Cord, Roy D. Chapin, Robert C. Graham, Charles D. Hastings, F. J. Haynes and L. A. Miller. T. R. Dahl and R. P. Page, Jr., were also present.

Willys (Eng.) Buys A. J. S.

Sir William Letts, chairman of Willys-Overland-Crossley, Ltd., British subsidiary of Willys-Overland Co., Toledo, states that the firm has purchased the good will and stock-in-trade of A. J. Stevens & Co. (1914), td., of Wolverhampton, and have taken over the car known as the "A.J.S.," which will be manufactured henceforth in the Willys company's factory in Manchester.

The Willys company already manufactures an all-British truck, known as the "Manchester," and the acquisition of A. J. Stevens marks a further step in the footing which this American concern is gaining in the British industry.

The motorcycle business of A. J. Stevens & Co. was acquired previously by the Matchless Motor Cycle Co. of Woolwich.

King Does an Enoch Arden

CHICAGO, Dec. 2—E. F. King, one of the founders in 1910 of the Available Truck Co., Chicago, has returned to the company as general manager after an absence of 12 years, and will continue the company's production of "custom-built" trucks, with each unit-engineered as to chassis body to perform specific hauling jobs. In 1919 Mr. King organized and was president of King-Zetler Co., Chicago builders of motor trucks and trailers.

Gasoline Sale Control Sought by Province

MONTREAL, Nov. 30—Support for Quebec's government plan to control the sale of gasoline in the same manner as liquor is now controlled, is advanced by T. C. Kirby, general manager of the Montreal Motorist League. "Officials of the League believe that government control of gasoline would work to the best interests of the motoring public at large," Mr. Kirby said. "It would do away with the middleman's profit and would enable the Quebec government to increase the tax without an added expense to the motorist. The League has been advocating government control for the past five years and we are glad that the government has at last decided to take action. It is believed that government control will also do away with 'bootleg' gasoline and that the motorist will be assured of quality under government supervision." A resolution supporting the idea is to be sent to Premier Taschereau by the directors of the League.

I.H.C. Shifts Production

CHICAGO, Dec. 2—International Harvester Co. is transferring production of farm and industrial tractors, formerly conducted at the Chicago tractor works, to Milwaukee, leaving only the Trac-tractor type production at the Twenty-sixth Street plant. The move was designed solely for economy and efficiency in operation, officials explain.

Under the new arrangement the heavy-type wheel tractors will be concentrated in Milwaukee, the Farmall tractors in Rock Island, and the Chicago works left free of all types except the track-laying. Operations at the Chicago works were stepped up to four days a week, from three days, along with other plants of the company Nov. 1.

Indian Has 3 New Lines

NEW YORK, Nov. 30 — Indian Motorcycle Co. has announced three new models of motorcycles for their 1932 line. These new models are designed for sport, police and utility requirements.

October Drops to 1921 Mark

Reaches Lowest Figure Since December, 1921

WASHINGTON, Dec. 3—Production of motor vehicles in the United States in October dropped to the low point of 80,142 units from 140,566 in September, according to reports received by the Bureau of the Census from 144 manufacturers.

This is the lowest point reached since December, 1921, on the basis of the production reports of the Bureau of the Census.

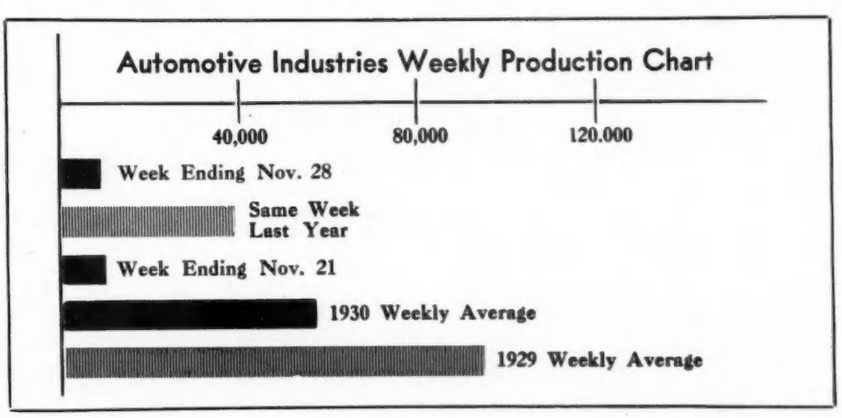
The October output consisted of 57,764 passenger cars, 21,727 motor trucks and 651 taxicabs. For the first 10 months of the current year the output totaled 2,199,330 motor vehicles as against 3,063,531 in the corresponding period of last year. The 1931 production consisted of 1,822,117 passenger cars, 373,321 trucks and 3892 taxicabs.

The Canadian production in October totaled 1440 motor vehicles, made up of 761 passenger cars and 679 trucks. The September output of motor vehicles was 2646. In the first 10 months of 1931 the production was 78,942 vehicles, comprised of 62,257 passenger cars and 16,685 trucks, and compares with 143,163 in the corresponding period of last year, made up of 117,690 passenger cars and 25,473 trucks.

Schwartz Company Formed

NEW YORK, Dec. 2—The Schwartz Cycle Engine Corp., formerly known as the Air Injection Engine Corp., has elected J. R. Harbeck of Harbeck & Pell, as president. Mr. Harbeck was formerly president of the Duesenberg Motors Corp. and several years ago was responsible for the reorganization of the Maxwell Chalmers Co.

Other officers are Alfred I. Schwartz, vice-president; John J. Dobson, secretary and treasurer; board of directors consists of officers with Gerald Hollins and Leonard Baldwin.



General Motors Income Account

SUMMARY OF CONSOLIDATED INCOME

FOR THE NINE MONTHS ENDED SEPT. 30, 1931, AND 1930

	1931		1930	
	Third Quarter	Nine Months	Third Quarter	Nine Months
Sales of Cars and Trucks—Units:				
Retail sales by dealers to consumers—United States	206,670	800,234	242,378	900,207
General Motors sales to dealers—United States	189,285	814,959	216,757	896,329
General Motors sales to dealers, including Canadian sales and overseas shipments	215,649	939,846	244,378	1,008,597
Net Sales—Value	$168,494,620	$692,688,152	$223,393,368	$837,712,157
Profit from operations and income from investments, after all expenses incident thereto, but before providing for depreciation of real estate, plants, and equipment	$26,775,787	$153,092,397	$41,363,855	$181,487,655
Provision for depreciation of real estate, plants, and equipment	9,254,315	28,319,298	9,404,547	28,211,427
Net Profit from operations and investments	$17,521,472	$124,773,099	$31,959,308	$153,276,288
Non-operating profit from the sale of 1,375,000 shares of General Motors Corporation common capital stock to General Motors Management Corporation	—	—	—	9,517,943
Total Net Profit	$17,521,472	$124,773,099	$31,959,308	$162,794,171
Less provision for:				
Employees savings and investment fund	$1,923,174	$7,526,648	$2,014,500	$8,287,379
Deduct profit on investment fund stock reverting to General Motors Corporation	626,995	1,802,676	703,394	2,161,808
Employees savings and investment fund—net	$1,296,179	$5,723,972	$1,311,106	$6,125,571
Payment to General Motors Management Corporation	221,000	5,686,000	1,129,000	9,235,000
Special payment to employees under stock subscription plan	40	55,420	162	69,838
Total	$1,075,219	$11,465,392	$2,440,268	$15,430,409
Net Income before Income Taxes	$16,446,253	$113,307,707	$29,519,040	$147,363,762
Less provision for United States and foreign income taxes	1,818,000	12,858,000	3,136,000	16,096,000
Net Income for the Period	$14,628,253	$100,449,707	$26,383,040	$131,267,762
General Motors Corporation's Proportion of Net Income	$14,640,453	$100,505,207	$26,383,040	$131,267,762
Dividends on preferred and debenture capital stocks:				
Preferred—$5 series	$2,344,152	$7,031,691	$1,731,745	$2,025,635
Seven per cent preferred	—	—	614,979	5,055,966
Six per cent preferred	—	—	6,374	47,483
Six per cent debenture	—	—	8,871	65,651
Total	$2,344,152	$7,031,691	$2,361,969	$7,194,735
Amount Earned on Common Capital Stock	*$12,296,301	*$93,473,516	*$24,021,071	*$124,073,027
*NOTE: Including the General Motors Corporation's equity in the undivided profits or the losses of Yellow Truck & Coach Mfg. Co., Ethyl Gasoline Corp., Vauxhall Motors, Limited, Adam Opel A.G., Bendix Aviation Corp., General Aviation Corp., General Motors Radio Corp., and Kinetic Chemicals, Incorporated (since Jan. 1, 1931), the amount earned on the common capital stock is	$10,989,062	$90,423,699	$23,108,728	$124,208,390
Including the equity in the undivided profits or the losses of the above mentioned subsidiaries not consolidated, the amount earned per share of common capital stock outstanding (43,500,000 shares) is	$0.25	$2.08	$0.53	†$2.85

†NOTE: Non-operating profit in 1930 after taxes, etc., was equivalent to $0.17 per share of common capital stock. Excluding this non-operating profit, the amount earned on the common capital stock for the first nine months of 1930 was equivalent to $2.68 per share.

SUMMARY OF CONSOLIDATED SURPLUS

FOR THE NINE MONTHS ENDED SEPT. 30, 1931, AND 1930

	1931		1930	
	Third Quarter	Nine Months	Third Quarter	Nine Months
Surplus at beginning of period	$360,192,490	$344,265,275	$415,375,774	$380,560,273
General Motors Corporation's Proportion of Net Income, per Summary of Consolidated Income	14,640,453	100,505,207	26,383,040	131,267,762
Capital surplus arising through the exchange of six per cent preferred and six per cent debenture capital stocks for seven per cent preferred capital stock	—	—	—	13,545
Total	$374,832,943	$444,770,482	$441,758,814	$511,841,580
Surplus charges arising through the exchange of seven per cent preferred, six per cent preferred and six per cent debenture capital stocks for preferred capital stock—$5 series	—	—	4,468,996	4,468,996
Surplus before dividends	$374,832,943	$444,770,482	$437,289,818	$507,372,584
Less cash dividends paid or accrued:				
Preferred capital stock—$5 series	$2,344,152	$7,031,691	$1,731,745	$2,025,635
Seven per cent preferred capital stock	—	—	614,979	5,055,966
Six per cent preferred capital stock	—	—	6,374	47,483
Six per cent debenture capital stock	—	—	8,871	65,651
Total	$2,344,152	$7,031,691	$2,361,969	$7,194,735
Common capital stock:				
Mar. 12 ($0.75 on 43,500,000 shares)	$ —	$32,625,000	$ —	$32,625,000
June 12 ($0.75 on 43,500,000 shares)	—	32,625,000	—	32,625,000
Sept. 12 ($0.75 on 43,500,000 shares)	32,625,001	32,625,001	32,625,001	32,625,001
Total	$32,625,001	$97,875,001	$32,625,001	$97,875,001
Total cash dividends paid or accrued	$34,969,153	$104,906,692	$34,986,970	$105,069,736
Surplus at end of period	$339,863,790	$339,863,790	$402,302,848	$402,302,848

A.S.M.E. Meeting Closes in N. Y.

NEW YORK, Dec. 3—The annual meeting of the American Society of Mechanical Engineers closed today. President-elect for 1932 is Conrad N. Lauer, president of the Philadelphia Gas Works Co.

The technical sessions comprised materials handling, management and metal cutting. F. E. Raymond presented a follow-up report on formulas for the selection and replacement of equipment. Details of papers and discussion will be published next week.

The feature session was the stabilization symposium with papers by James W. Hook, president, Geometric Tool Co.; Paul M. Mazur and Virgil Jordan, economist, *Business Week*. Dean W. B. Donham of Harvard presented the fourth Towne lecture, Tuesday, on the present economic situation.

White Books Big Order

CLEVELAND, Dec. 2—The White Motor Co. today announced receipt of an order from the City of New York for 774 heavy-duty trucks for refuse hauling and street-cleaning purposes.

The value of the order is approximately $2,600,000 and constitutes the largest single order received since the war.

Three thousand employees will go on full-time employment, and employment may be increased at several accessory companies supplying the White organization.

Aero Show Blanks Sent

DETROIT, Nov. 30—Application blanks for space in the National Aircraft Show of 1932 are in the mails, and work on the exposition is under way, William B. Mayo, chief engineer, Ford Motor Co., and chairman of the show's board of control, states. The show will be held on Detroit Airport next April 2 to 10.

Deere Workers Return

CHICAGO, Dec. 2—One thousand employees of John Deere Tractor Co., Waterloo, Iowa, return to work Dec. 7 on a two-days-a-week schedule, it was announced yesterday. The plan is to keep deserving employees at work on such production as the company can provide.

Exports, Imports and Reimports of the Automotive Industry For October and Ten Months Ended October, 1931-30

	Month of October				Ten Months Ended October			
	1931		1930		1931		1930	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories	....	$8,492,427	....	$14,542,352	.....	$133,220,143	.....	$248,055,420
*Electric trucks and passenger cars	....	.....	1	4,199	.....	.....	31	58,446
Motor trucks and buses except electric (total)	4,500	2,085,222	4,079	2,677,301	43,731	22,879,958	73,801	49,280,090
**Under one ton	152	47,917	1,827	846,576	6,125	2,103,685	29,070	15,390,921
**One and up to 1½ tons	4,031	1,560,029	2,063	1,471,119	32,569	14,191,077	41,044	26,316,043
**Over 1½ tons to 2½ tons	190	192,928	189	359,606	3,327	3,859,283	3,687	7,573,126
Over 2½ tons	46	65,947	....	.....	1,251	2,228,549	.....	.....
PASSENGER CARS								
Passenger cars except electric	....	.....	....	.....	.....	.....	.....	.....
Low price range, $850 inclusive	2,494	1,367,382	5,281	2,563,920	59,423	28,833,578	100,072	50,432,904
**Medium price range, over $850 to $1,200	422	398,355	1,548	1,695,107	9,466	9,086,954	33,089	34,403,336
**$1,200 to $2,000	102	139,880	307	706,988	2,626	3,776,976	4,773	11,401,798
**Over $2,000	67	156,777	....	.....	1,439	3,653,831	.....	.....
PARTS, ETC.								
Parts, except engines and tires	....	.....	....	.....	.....	.....	.....	.....
Automobile unit assemblies	....	2,098,517	....	3,469,661	.....	36,031,001	.....	54,619,444
Automobile parts for replacement (n.e.s.)	....	1,803,913	....	2,881,257	.....	22,684,314	.....	36,881,047
Automobile accessories	....	211,949	....	370,774	.....	2,863,643	.....	4,864,266
Automobile service appliances (n.e.s.)	....	1,294,496	....	269,102	.....	3,151,390	.....	5,358,208
Trailers	6	1,701	31	21,285	579	197,541	1,186	553,058
Airplanes, seaplanes and other aircraft	10	75,006	9	121,710	122	1,695,410	260	3,861,792
Parts of airplanes, except engines and tires	....	67,820	....	191,216	.....	1,426,407	.....	1,944,914
BICYCLES, ETC.								
Bicycles	90	1,982	222	5,357	1,280	32,108	3,374	89,939
Motorcycles	220	49,980	430	107,769	5,184	1,240,908	9,725	2,273,816
Parts and accessories, except tires	....	29,563	....	59,775	.....	508,498	.....	871,046
INTERNAL COMBUSTION ENGINES Stationary and Portable								
Diesel and Semi-Diesel	15	84,971	35	64,698	262	392,093	271	803,219
Other stationary and portable:								
Not over 10 hp.	413	31,165	1,185	94,597	6,795	528,091	22,499	1,684,130
Over 10 hp.	435	215,955	70	46,692	4,130	2,013,314	3,971	2,197,983
Automobile engines for:								
Motor trucks and buses	570	73,076	15	4,619	5,576	789,500	19,078	1,576,013
Passenger cars	1,021	75,214	1,115	105,753	17,827	1,395,851	39,772	3,855,246
Tractors	5	300	6	5,088	28	6,415	248	105,071
Aircraft	3	5,025	40	191,965	243	1,137,247	334	1,481,308
Accessories and parts (carburetors)	....	130,078	....	219,331	.....	1,896,854	.....	2,989,514
IMPORTS								
Automobiles and chassis (dutiable)	84	47,283	87	83,800	594	688,992	548	767,613
Other vehicles and parts for them (dutiable)	....	7,166	....	7,288	.....	55,197	.....	347,017
REIMPORTS								
Automobiles (free from duty)	47	26,427	44	43,222	242	183,284	284	275,041

*Not shown separately after 1930.
**Classification changes beginning January, 1931.

Buys Harvey Division

RACINE, WIS., Nov. 30—The Standard Steel Spring Co., Coraopolis, Pa., has acquired the automotive spring division of the Harvey Spring & Forging Co., including one large factory building at Phillips Avenue and the Milwaukee tracks which is now being remodeled for early resumption of production. The Harvey company will continue to manufacture replacement springs, forgings, the wagon hardware and woodstock departments.

Perfect Circle Steps Up

CHICAGO, Nov. 30—Perfect Circle Co., Hagerstown, Ind., announces piston ring production has been stepped up 66 per cent in all three of the company's plants, in Hagerstown, Tipton and New Castle. Large orders received from automobile manufacturers starting to build their 1932 lines are credited with the increase.

G.M. of Canada Adds Workers to Payroll

OSHAWA, ONT., Dec. 2 — Recently General Motors of Canada, Ltd., took back approximately 500 men at the body rooms, paint shop and other parts of the plant opened with work commencing on the new 1932 models. Employees in the mill room and stamping plant have been working some time, while the assembly lines will be started shortly in order to provide dealers with new models.

Kissel Sales Date Set

HARTFORD, WIS., Nov. 30—Monday, Dec. 21, has been fixed as the date of the public sale of the properties of the Kissel Motor Car Co., according to an announcement by George A. Kissel and Thomas L. Davison, co-receivers. Originally the sale was to have been held Oct. 27 but it was postponed to Nov. 23, when it was again set forward.

Commercial Credit Declares Dividend

NEW YORK, Nov. 30—Commercial Credit Co. has declared a dividend of 40 cents on common stock, together with all regular quarterly dividends on preferred stock issues payable Dec. 31 to stockholders of record Dec. 11.

Winter May Strangle Canadian Highways

MONTREAL, Dec. 1 — The bright prospects of increased mileage in winter roads have faded somewhat with the announcement from the provincial road authorities to the Royal Automobile Club of Canada, that unless action is taken immediately by interested municipalities and private concerns there will be no winter highways in Quebec province this year. For some time a number of committees have been at work seeking to secure the necessary funds, $100 a mile, which the government demands from municipalities through which the roads pass, and the approbation of these municipalities which is also necessary.

The government reports that not one application for winter roads has been received to date, and an ultimatum is made that such applications must be sent in within a very short time or it will be impossible to keep the roads open this winter. The club has definite information that the Toronto-Montreal highway, and several roads about the Island of Montreal will be maintained; there is also the hope that the St. Johns-Burlington-New York road will be kept open.

September Gasoline Consumption Increases 1.5 Per Cent Over '30

NEW YORK, Nov. 30—Gasoline consumption in 47 states and the District of Columbia for the month of September, 1931, as indicated by reports made by wholesalers and dealers in the various states, under provisions of the gasoline tax laws or gasoline inspection laws, totaled 1,365,191,000 gal., compared with 1,345,108,000 gal. in September, 1930, an increase of 20,083,000 gal., or 1.5 per cent, according to the American Petroleum Institute. Daily average consumption for September, 1931, was 45,506,000 gal., compared with a daily average of 49280,000 gal. in August, 1931, a decrease in daily average during September of 7.7 per cent.

Gasoline consumption in these 47 states and the District of Columbia for the nine months ending with September, 1931, amounted to 11,307,616,000 gal., compared with 10,871,200,000 gal. for the corresponding period of 1930, an increase of 499,416,000 gal., or 4.6 per cent.

GASOLINE CONSUMPTION BY STATES, SEPTEMBER, 1931

	Tax Per Gallon Cents	Month of Aug., 1931 Gallons	Month of Sept., 1931 Gallons	Month of Sept., 1930 Gallons	9 Months Ending With Sept., 1931 Gallons	9 Months Ending With Sept., 1930 Gallons
Alabama	5	14,608,000	13,803,000	14,675,000	123,820,000	131,203,000
Arizona	5	6,157,000	6,151,000	6,276,000	56,441,000	57,099,000
Arkansas	6	11,369,000	13,576,000	12,765,000	97,645,000	105,616,000
Colorado	4	18,819,000	15,078,000	16,693,000	138,697,000	132,644,000
Connecticut	2	24,650,000	22,152,000	20,642,000	167,145,000	168,149,000
Delaware	3	3,859,000	3,712,000	3,361,000	28,757,000	27,449,000
Dist. of Colum.	2	8,390,000	8,126,000	6,946,000	69,180,000	59,920,000
Florida	7	15,780,000	16,557,000	16,348,000	174,724,000	160,363,000
Georgia	6	21,037,000	18,544,000	19,808,000	166,228,000	169,129,000
Idaho	5	6,841,000	6,152,000	6,789,000	46,037,000	46,897,000
Illinois	3	102,187,000	95,183,000	91,146,000	767,033,000	731,540,000
Indiana	4	48,492,000	44,205,000	42,647,000	366,881,000	346,253,000
Iowa	3	43,374,000	33,790,000	37,572,000	319,426,000	297,253,000
Kansas	3	49,330,000	31,074,000	36,039,000	322,553,000	304,229,000
Kentucky	5	17,321,000	16,432,000	15,624,000	131,988,000	126,257,000
Louisiana	5	17,291,000	16,804,000	15,960,000	139,869,000	137,444,000
Maine	4	15,783,000	13,168,000	12,670,000	87,993,000	81,861,000
Maryland	4	18,125,000	18,169,000	17,399,000	141,182,000	136,932,000
Massachusetts	3	60,805,000	53,832,000	50,390,000	426,791,000	402,249,000
Michigan	3	85,079,000	69,469,000	73,776,000	606,949,000	601,757,000
Minnesota	3	49,809,000	38,761,000	41,211,000	339,586,000	304,960,000
Mississippi	5	*11,686,000	*11,042,000	12,319,000	*99,053,000	102,135,000
Missouri	2	48,488,000	43,249,000	40,732,000	362,727,000	330,514,000
Montana	5	8,447,000	6,239,000	10,486,000	60,314,000	59,553,000
Nebraska	4	24,787,000	18,976,000	21,231,000	177,864,000	174,183,000
Nevada	4	2,529,000	2,173,000	1,889,000	17,947,000	14,217,000
New Hampshire	4	9,089,000	7,505,000	6,998,000	51,926,000	49,723,000
New Jersey	3	56,444,000	53,773,000	50,050,000	433,686,000	410,498,000
New Mexico	5	5,285,000	4,551,000	5,154,000	40,215,000	40,903,000
New York	2	169,019,000	154,946,000	142,343,000	1,221,413,000	1,140,858,000
North Carolina	6	21,185,000	23,814,000	22,806,000	177,567,000	183,781,000
North Dakota	3	14,650,000	10,229,000	14,290,000	93,401,000	98,050,000
Ohio	4	98,874,000	87,171,000	81,084,000	747,872,000	739,865,000
Oklahoma	5	27,353,000	27,284,000	30,149,000	232,828,000	245,355,000
Oregon	4	17,661,000	15,948,000	16,779,000	135,776,000	131,310,000
Pennsylvania	3	104,435,000	102,953,000	83,965,000	785,657,000	661,269,000
Rhode Is'and	2	10,674,000	8,905,000	8,266,000	74,160,000	66,207,000
South Carolina	6	11,169,000	10,730,000	10,724,000	90,879,000	88,545,000
South Dakota	4	12,674,000	10,780,000	14,862,000	107,164,000	110,200,000
Tennessee	6	19,853,000	19,849,000	20,090,000	157,763,000	161,080,000
Texas	4	80,555,000	69,486,000	73,662,000	624,322,000	608,316,000
Utah	4	5,825,000	5,364,000	5,464,000	47,254,000	46,678,000
Vermont	4	6,519,000	5,614,000	5,334,000	36,950,000	35,343,000
Virginia	5	24,245,000	23,340,000	20,738,000	180,409,000	169,709,000
Washington	5	27,270,000	24,438,000	25,768,000	210,576,000	208,113,000
West Virginia	4	14,947,000	14,891,000	14,600,000	106,106,000	105,024,000
Wisconsin	4	50,145,000	43,429,000	42,898,000	346,866,000	332,208,000
Wyoming	4	4,764,000	3,774,000	3,690,000	30,996,000	28,359,000
Total		1,527,678,000	1,365,191,000	1,345,108,000	11,370,616,000	10,871,200,000
Daily Average.		49,280,000	45,506,000	44,837,000	41,651,000	39,821,000
Increase over previous year: Amount of Increase		.....	20,083,000	.....	499,416,000	.....
Percentage increase in Daily Aver.		.....	1.5%	.....	4.6%	.....

	Tax Per Gallon Cents	Quarter Ended June 30, 1931	Quarter Ended Sept. 30, 1931	Quarter Ended Sept. 30, 1930	9 Months Ending With Sept. 30, 1931	9 Months Ending With Sept. 30, 1931
California	3	389,715,000	347,437,000	357,199,000	1,072,954,000	999,416,000

* Estimated.

Materials Index Steady

NEW YORK, Dec. 1—After a long period of gradual decline, the automotive raw materials index, compiled by Ray B. Prescott for *Automotive Industries*, hung at 88 points in the middle of November, which was the figure reached in the middle of October. A year ago, in November, the index stood at 100 points. The Bradstreet index of general raw materials prices stood at 90 for November of this year.

To Introduce New Lining

NEW YORK, Nov. 30—World Bestos Corp., Paterson, N. J., will introduce at the joint M.E.A. and N.S.P.A. Show a new full-molded, semi-rigid, brake lining in rolls.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Salon, New York City.....Nov. 29-Dec. 5
Motorcycle Show, London..Nov. 30-Dec. 5
Buenos Aires, S. A., Automobile.Dec. 18-27
National Automobile, New York..Jan. 9-16
San Francisco, Automobile.....Jan. 9-16
Newark, N. J., Automobile.....Jan. 16-23
Cincinnati, Automobile .....Jan. 17-23
Milwaukee, Wis., Automobile...Jan. 17-23
Philadelphia, Automobile .....Jan. 18-23
Louisville, Ky., Automobile....Jan. 18-23
Omaha, Neb., Automobile.....Jan. 18-23
Boston, Mass., Automobile.....Jan. 23-30
Minneapolis, Minn., Automobile.Jan. 23-30
Hartford, Conn., Automobile...Jan. 23-30
Detroit, Automobile .....Jan. 23-30
Montreal, Automobile .....Jan. 23-30
Baltimore, Automobile .....Jan. 23-30
Pittsburgh, Pa., Automobile...Jan. 23-30
Portland, Ore., Automobile.....Jan. 23-30
Springfield, Mass., Automobile..Jan. 25-30
Harrisburg, Pa., Automobile...Jan. 25-30
St. Petersburg, Fla., Automobile, Jan. 27-29
National Automobile, Chicago, Jan. 30-Feb. 6
Salon, Chicago .....Jan. 30-Feb. 6
Washington, D. C., Automobile Jan. 30-Feb. 6
Cleveland, Automobile ....Jan. 30-Feb. 6
Springfield, Ill., Automobile.....Feb. 4-6
St. Paul, Automobile.....Feb.6-13
St. Louis, Automobile .....Feb. 7-12
Denver, Colo., Automobile.....Feb. 8-13
Salon, Los Angeles, Calif.....Feb. 13-20
Kansas City, Automobile.....Feb. 13-20
Mankato, Minn., Automobile...Feb. 17-20
Peoria, Ill., Automobile.....Feb. 17-21
Holyoke, Mass., Automobile...Feb. 18-22
Des Moines, Iowa, Automobile..Feb. 21-26
Wichita, Kans., Tractor and Power Equipment .....Feb. 23-26
Salon, San Francisco, Calif..Feb. 27-Mar. 5
Albany, N. Y., Automobile..Feb. 27-Mar. 5
Berne, Switzerland, Automobile.Mar. 11-20
National Aircraft, Detroit, Mich..Apr. 2-10

CONVENTIONS

American Roadbuilders Association, Detroit, Mich. .....Jan. 11-14, 1932
S.A.E. Annual Dinner, New York City, Jan. 14
S.A.E. Annual Meeting, Detroit, Mich., Jan. 25-29

Arnstein Goes to Germany

Dr. Karl Arnstein, vice-president and chief engineer of the Goodyear-Zeppelin Corp., sailed Dec. 2 for Germany, where he will visit the Luftschiffbau-Zeppelin works in Friedrichshafen. Dr. Arnstein will spend the holidays at his home in Germany before returning to the United States.

Houdaille Reports Profit

NEW YORK, Nov. 30 — Houdaille-Hershey Corp. report net profit for the nine months ended Sept. 30 of $486,329. This compares with combined net profits of the first nine months last year of $379,743.

Regardless of PRICE CLASS

REGARDLESS of price class, leading car manufacturers find they can effect a noticeable economy—by standardizing on Burgess Full Power, Straight-Thru Mufflers. Muffling is obtained in only one cost—the price of the Muffler—without the continued cost of high back pressure, reduced top speed, valve burning, and lowered fuel economy.

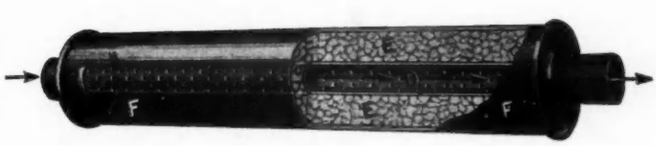
Where the ultimate in Mufflers is required, regardless of cost, Burgess Straight-Thru Mufflers permit quieting never before obtainable, because satisfactory silencing is secured without any of the attending evils of high back pressure.

Car manufacturers in the highly competitive, low-priced fields are finding, that the saving in horse power results in increased top-speed and improved car performance. Further, they have found that this saving can be economically effected in a single change—by standardizing on the Burgess Full Power Mufflers.

BURGESS

"STRAIGHT-THRU"

MUFFLER



As illustrated above, the Burgess Muffler consists of three principal parts; a straight open perforated pipe, D, surrounded by a sound absorbing material, E, which is enclosed in a metal covering, F. The exhaust gases from the engine pass straight through the perforated pipe, D, but the exhaust noises are absorbed, assuring satisfactory muffling.

BURGESS BATTERY COMPANY
111 WEST MONROE STREET, CHICAGO

ENGINEERS AND MANUFACTURERS OF ELECTRIC AND ACOUSTIC PRODUCTS

Flood-Tide of New Engineering Ideas Launches the 1932 Chevrolet Line

(Continued from page 868)

Eighteen-inch wheels with 5.25-in. section tires on drop center rims are now standard equipment, the same design of riveted spoke wire wheels being retained. The smaller wheel permitted a reduction in thickness of the hub shell, reducing the unsprung weight.

The outstanding changes in structural design in the bodies and sheet metal are:

1. Fender mounted from center of frame.
2. Reinforced hood.
3. Internal hood catch with single center handle.
4. Center-mounted radiator.
5. Built-in vertical-line grille.
6. Reinforced shell braced to headlamp tie bar.
7. Doors extended to bottom of sill.
8. Heavier wood structure.
9. Cowl ventilator added.
10. Forged side arms on open body windshields.
11. Roadster tops fold into body in space back of seat.
12. Streamlined fronts in closed bodies.
13. Heavier reinforcing structure at front pillars.
14. Push and pull front seat adjustment (except on coach, landau, phaeton and 5-passenger coupe).
15. Wider angle dovetails to insure easier door opening.
16. Equalizer on left front window regulator.
17. Heavier door hinges.
18. Improved tool compartment with two-piece cover on coach, landau, phaeton and 5-passenger coupe.

Of these the most interesting perhaps is the new front-end bracing. The idea here has been to tie fenders and headlamps as well as the radiator into the body so that they will move or act as a unit rather than independently.

In the 1932 Chevrolet fender braces extend over the frame side rails, from which they are insulated by rubber, and meet in a single piece at the center of the front cross-member. Here there is a single support, of rubber, carrying both this fender brace and the radiator core. Fenders are further tied together with a double chrome-plated tie bar. This tie bar in turn is attached to the radiator structure by a brace from below the headlamp mounting. The radiator shell in turn is strongly reinforced, as shown in the accompanying illustration.

There is the usual V-brace between radiator and body dash, and in addition the more rigid hood locks to the radiator shell and dash instead of the frame through its single control handle, thereby increasing the effectiveness of the hood as a brace for the radiator. The net effect is the provision of a front end that is remarkably stable to the driver's eyes.

The radiator grille is a single stamping with the vertical vanes projected forward and chrome plated. The radiator filler cap is a die casting, chrome plated. It has a spring diaphragm rotary seat to prevent sticking.

While body pillars are sloping, the doors are straight between the hinges, the upper one of which is above the belt. An oil hole is provided in the door hinges for lubrication. There are only two hinges instead of three, but they are heavier. This also permits hinge location at points where they do not project as much from the body. Cowl ventilators are used to supply ventilation back of the dash, since the more sloping new shield with narrower upper header panel does not permit as wide an opening as formerly. Visibility, however, is decidedly better, and fenders can be seen from the normal driving position. The upward angle of vision is also greater.

Further changes in the bodies, contributing to increased comfort and new appearance, include the following:

1. Front fenders have deeper crowns and skirts with wider beads at their edges.
2. Radiator splash guards are new and beaded, with neater appearance.
3. Cord-welt is used between the splash guard and radiator shell as trim and anti-squeak.
4. Louvres are replaced by ventilator doors, chrome plated on sport and de luxe models.
5. An angle section reinforcement is spot welded to the inside of the hood side panel along the lower edges of the doors to prevent noise and buckling.
6. Rear fenders have deeper crowns and longer rear ends.
7. Headlamps are longer than formerly and a somewhat smaller diameter. They are chrome plated, and carry convex lenses.
8. A trumpet type horn is mounted below the left headlamp, and is chrome plated.
9. In sport and de luxe models cowl lamps are provided. These have Stimsonite lenses of the reflex type, reflecting the light from headlamps of approaching vehicles.
10. Tail lamps have reflex elements in the glass.
11. Floating rings instead of spring contacts are used in the dimmer switch.
12. The stop light switch is connected to the brake pedal with an adjustable link.
13. Convex lenses are used for the instruments.
14. The windshield wiper motor is located inside the body. Wiper rod and blade are a separate unit outside the body. The blade has an automatic return.
15. A carpet kick pad has been added in the rear compartment of the phaeton.
16. The external visor is replaced by a universally adjustable visor inside the body.
17. Rear view mirrors are of the two-position type for tall and short drivers.
18. The top rail of the instrument panel carries an ash receiver.

Records Promote New Chevrolet

FOR the first time a phonograph record was used to announce a new line to prospects. General Motors took this novel way of calling the attention of potential buyers to the 1932 Chevrolet line by mailing 1,275,000 4-in. Durium records, made by Durium Products, Inc., New York. Nearly 12,000 standard size records were mailed to Chevrolet dealers.

The small record plays for a minute and a half. The large record runs five minutes.

To-day the engineering brains of the automobile industry are centered upon the conquest of noise. In the field of body-building, Budd has overlooked no opportunity to secure quietness. Take the matter of doors, for example. Die-formed inner and outer panels are clinched and electrically welded into a single unit—then mounted in a die-formed door opening. This insures perfect fit and eliminates a frequent source of noise. Only one of the reasons why the Budd one-piece body is quiet—permanently quiet.

★ BODIES BY BUDD ★

Originators of the All-Steel Body. Supplied to Manufacturers in the United States, Great Britain, France, Germany.

Olympia Truck Show

(Continued from page 877)

intention, as a rule, is merely to provide a super-high gear. A transmission feature first seen on a Leyland chassis at the 1929 Show and now appearing on three other makes, displayed at the show, is a torsional vibration damper between the two sections of the open propeller shaft.

Crossley, who has hitherto specialized in buses, has entered the truck field with a six-ton, oil-engine type; double reduction drive is used, triple servo braking with two servos on the front axle swivels and, as on the bus chassis, a rotary exhauster for vacuum braking and vacuum feed from the main tank to the fuel pumps.

Morris on the new four-cylinder, 4-ton truck and the new six-cylinder, double-deck bus chassis, both with "high-camshaft" valve operation, fits a scavenging pump in the rear end of the crankcase to send surplus oil back to the sump if, when hill-climbing, the rear part of the base chamber becomes flooded. The engine with a bore and stroke of 110 x 135 mm. develops 120 b.hp. at 2500 r.p.m. There is an intermittent oil feed (at every revolution of the pressure pump shaft) to the camshaft trough; the powerplant is readily detachable with the radiator, front springs and front axle, all of them forming a unit attached to a subframe that can be wheeled forward after a series of bolts have been removed.

There is a general tendency for makers to increase the number of their models. For instance, Thornycroft now has 20 basic types including trucks of from 2 to 11 tons and buses of from 20 to 52 passengers; with options in wheelbase length and driving position there are 40 models in all. Leyland has 24 models with 13 basic types; Morris has 21 models, Karrier 20 and Albion 22. These wide range programs are to some extent made practicable by a comprehensive interchangeability of parts.

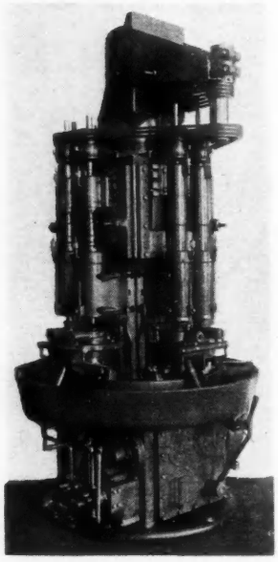
The number of visitors to the Show this year has been larger than in 1929. Optimism concerning the sales outlook is almost universal, though in some quarters concern has been expressed that the introduction of so many oil-engined models, many of them admittedly more or less experimental, may cause prospects to hold back; they may hesitate to buy gasoline-engined models for fear these will soon be out of date, and oil-engined vehicles because of lack of experience with regard to their dependability and cost of maintenance. One or two makers who are offering an oil engine as an option agree to replace it by a gasoline engine if it should not prove to be satisfactory.

Coulter Diamond Boring Machine Designed for High Production

The increasing use of diamond boring for finishing connecting rod bearings, pistons, bushings, etc., lends particular significance to the new Coulter production diamond tool boring machine recently placed on the market by The Automatic Machine Co., Bridgeport, Conn. This is probably the first high production machine of its kind. It has eight spindles arranged in four vertical stations of revolving turret type.

Completely automatic action is featured, the operator unloading and loading the fixtures as they come in turn to the idle position at the front of the machine. As illustrated, the machine is set up for connecting rods with a production of 10 per minute, and on this or similar parts, the production can be varied by means of change gears.

Power is taken from the motor shaft by means of a V-belt sheave to a jackshaft at the front of the machine. From the jackshaft power is taken by means of V-belts contacting all boring spindle sheaves except those at the loading position. As the turret revolves, the boring-spindle sheaves leaving the finished position gradually move out of contact with the V-belts so that the spindles will stop before reaching the unloading position. Likewise the spindles just leaving the loading position start to revolve before reaching the first boring position, as their sheaves make advance contact with the V-belts.



To take up the stretch of the large V-belts, the jackshaft is eccentrically mounted, whereas the main motor V-belts are tensioned by an adjustable idler. Spindles are splined to permit the rise and fall of the spindle heads as controlled by a feed cam mounted on the stationary central column. The machine illustrated is cammed for a fast roughing bore on the down stroke and a slow-finishing bore on the upward movement. Coulter fine adjustment micrometer spindles are furnished on this machine, and spindles of the conventional bearing type or the ball bearing type can be furnished as desired.

The fixture illustrated was designed for connecting rods. The stationary centers to the rear are adjustable, while each front center is movable and actuated by a bell crank mechanism. On the free end of each bell crank is a weight that is adjustable as to position in order to vary the clamping pressure. For the connecting rod in question, the pressure at each center is 12 lb.

Movable centers are independent of each other, and at the rear of the fixture is a bar that lifts the bell cranks and opens the centers when a shoe makes contact with a segment cam placed in the inner chip trough. This cam is located at the unloading position. Above the centers are placed swinging chip guards which prevent the babbitt and bronze chips from flying out over the fixture and getting mixed below. Babbitt chips collect in the outer trough by a wiping vane attached to the rotating turret and are pushed to a chute through which they fall into proper receptacles. Bronze chips fall into the inner trough where they are likewise pushed by a wiper vane to another chute.

Spindle speed 4300 r.p.m. Motor 15-20 hp., floor space 57 in. square, height 9 ft. 10 in., turret speed 2½ r.p.m., weight 12,000 lb.